

SEQUENCE LISTING

<110> St. Geme, Joseph W.

<120> HAEMOPHILUS ADHERENCE AND PENETRATION PROTIENS

<130> A-59941-1/RFT/DCF/DHR

<150> US 08/296,791

<151> 1994-10-25

<150> US 09/839,996

<151> 2001-04-20

<160> 58

<170> PatentIn version 3.1

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Tyr Lys Lys Asp Asn Leu His Pro Tyr Glu Asp Tyr His Asn Pro	
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Lys Thr	Lys Lys Val Arg	Ser	Lys Arg Ala Val	Phe	Ser Asp Pro	
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Thr Pro Ser Leu Ala Phe Asn	Arg Tyr Asn Ala Gly	Ile Arg Val	
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Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val Ser
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Arg Asn Gly Val Ala Ala Leu Val Glu Asn Gln Tyr Ile Val Ser Val
 85 90 95

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Asn Pro Asp Gln His Arg Phe Thr Tyr Lys Ile Val Lys Arg Asn Asn
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 130 135 140

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 180 185 190

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Val Arg Lys Ala Gly Glu Tyr Gly Pro Leu Pro Ile Ala Gly Ser Lys
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Pro Leu Lys Glu Lys Asp Lys Val His Asn Pro Arg Tyr Asp Gly Pro
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Asp Gln Lys Gln Gly Ser Leu Ile Phe Ala Ser Asp Ile Asn Gln Gly
 370 375 380

Ala Gly Gly Leu Tyr Phe Glu Gly Asn Phe Thr Val Ser Pro Asn Ser
 385 390 395 400

Asn Gln Thr Trp Gln Gly Ala Gly Ile His Val Ser Glu Asn Ser Thr
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Val Thr Trp Lys Val Asn Gly Val Glu His Asp Arg Leu Ser Lys Ile
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Gly Lys Gly Thr Leu His Val Gln Ala Lys Gly Glu Asn Lys Gly Ser
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Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu				
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Thr Phe Lys Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn				
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His Asn Thr Thr Gln Ala Ala Asn Val Thr Ile Thr Gly Asn Glu Ser				
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Ile Val Trp Asp His Asp Trp Ile Asn Arg Thr Phe Lys Ala Glu Asn				
	645		650	655
Phe Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val Ser Ser				
	660		665	670
Ile Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr Phe Gly				
	675		680	685

Val Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp Trp Thr
690 695 700

Gly Leu Thr Thr Cys Gln Lys Val Asp Leu Thr Asp Thr Lys Val Ile
705 710 715 720

Asn Ser Ile Pro Lys Thr Gln Ile Asn Gly Ser Ile Asn Leu Thr Asp
725 730 735

Asn Ala Thr Ala Asn Val Lys Gly Leu Ala Lys Leu Asn Gly Asn Val
740 745 750

Thr Leu Thr Asn His Ser Gln Phe Thr Leu Ser Asn Asn Ala Thr Gln
755 760 765

Ile Gly Asn Ile Arg Leu Ser Asp Asn Ser Thr Ala Thr Val Asp Asn
770 775 780

Ala Asn Leu Asn Gly Asn Val His Leu Thr Asp Ser Ala Gln Phe Ser
785 790 795 800

Leu Lys Asn Ser His Phe Ser His Gln Ile Gln Gly Asp Lys Gly Thr
805 810 815

Thr Val Thr Leu Glu Asn Ala Thr Trp Thr Met Pro Ser Asp Thr Thr
820 825 830

Leu Gln Asn Leu Thr Leu Asn Asn Ser Thr Ile Thr Leu Asn Ser Ala
835 840 845

Tyr Ser Ala Ser Ser Asn Asn Thr Pro Arg Arg Arg Ser Leu Glu Thr
850 855 860

Glu Thr Thr Pro Thr Ser Ala Glu His Arg Phe Asn Thr Leu Thr Val
865 870 875 880

Asn Gly Lys Leu Ser Gly Gln Gly Thr Phe Gln Phe Thr Ser Ser Leu
885 890 895

Phe Gly Tyr Lys Ser Asp Lys Leu Lys Leu Ser Asn Asp Ala Glu Gly
900 905 910

Asp Tyr Ile Leu Ser Val Arg Asn Thr Gly Lys Glu Pro Glu Thr Leu
 915 920 925

Glu Gln Leu Thr Leu Val Glu Ser Lys Asp Asn Gln Pro Leu Ser Asp
 930 935 940

Lys Leu Lys Phe Thr Leu Glu Asn Asp His Val Asp Ala Gly Ala Leu
 945 950 955 960

Arg Tyr Lys Leu Val Lys Asn Asp Gly Glu Phe Arg Leu His Asn Pro
 965 970 975

Ile Lys Glu Gln Glu Leu His Asn Asp Leu Val Arg Ala Glu Gln Ala
 980 985 990

Glu Arg Thr Leu Glu Ala Lys Gln Val Glu Pro Thr Ala Lys Thr Gln
 995 1000 1005

Thr Gly Glu Pro Lys Val Arg Ser Arg Arg Ala Ala Arg Ala Ala
 1010 1015 1020

Phe Pro Asp Thr Leu Pro Asp Gln Ser Leu Leu Asn Ala Leu Glu
 1025 1030 1035

Ala Lys Gln Ala Glu Leu Thr Ala Glu Thr Gln Lys Ser Lys Ala
 1040 1045 1050

Lys Thr Lys Lys Val Arg Ser Lys Arg Ala Val Phe Ser Asp Pro
 1055 1060 1065

Leu Leu Asp Gln Ser Leu Phe Ala Leu Glu Ala Ala Leu Glu Val
 1070 1075 1080

Ile Asp Ala Pro Gln Gln Ser Glu Lys Asp Arg Leu Ala Gln Glu
 1085 1090 1095

Glu Ala Glu Lys Gln Arg Lys Gln Lys Asp Leu Ile Ser Arg Tyr
 1100 1105 1110

Ser Asn Ser Ala Leu Ser Glu Leu Ser Ala Thr Val Asn Ser Met
 1115 1120 1125

Leu Ser Val Gln Asp Glu Leu	Asp Arg Leu Phe Val	Asp Gln Ala
1130	1135	1140
Gln Ser Ala Val Trp Thr Asn	Ile Ala Gln Asp Lys	Arg Arg Tyr
1145	1150	1155
Asp Ser Asp Ala Phe Arg Ala	Tyr Gln Gln Gln Lys	Thr Asn Leu
1160	1165	1170
Arg Gln Ile Gly Val Gln Lys	Ala Leu Ala Asn Gly	Arg Ile Gly
1175	1180	1185
Ala Val Phe Ser His Ser Arg	Ser Asp Asn Thr Phe	Asp Glu Gln
1190	1195	1200
Val Lys Asn His Ala Thr Leu	Thr Met Met Ser Gly	Phe Ala Gln
1205	1210	1215
Tyr Gln Trp Gly Asp Leu Gln	Phe Gly Val Asn Val	Gly Thr Gly
1220	1225	1230
Ile Ser Ala Ser Lys Met Ala	Glu Glu Gln Ser Arg	Lys Ile His
1235	1240	1245
Arg Lys Ala Ile Asn Tyr Gly	Val Asn Ala Ser Tyr	Gln Phe Arg
1250	1255	1260
Leu Gly Gln Leu Gly Ile Gln	Pro Tyr Phe Gly Val	Asn Arg Tyr
1265	1270	1275
Phe Ile Glu Arg Glu Asn Tyr	Gln Ser Glu Glu Val	Arg Val Lys
1280	1285	1290
Thr Pro Ser Leu Ala Phe Asn	Arg Tyr Asn Ala Gly	Ile Arg Val
1295	1300	1305
Asp Tyr Thr Phe Thr Pro Thr	Asp Asn Ile Ser Val	Lys Pro Tyr
1310	1315	1320
Phe Phe Val Asn Tyr Val Asp	Val Ser Asn Ala Asn	Val Gln Thr
1325	1330	1335
Thr Val Asn Leu Thr Val Leu	Gln Gln Pro Phe Gly	Arg Tyr Trp

1340	1345	1350
Gln Lys Glu Val Gly Leu Lys Ala Glu Ile Leu His Phe Gln Ile		
1355	1360	1365
Ser Ala Phe Ile Ser Lys Ser Gln Gly Ser Gln Leu Gly Lys Gln		
1370	1375	1380
Gln Asn Val Gly Val Lys Leu Gly Tyr Arg Trp		
1385	1390	
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Met Leu Asn Lys Lys Phe Lys Leu Asn Phe Ile Ala Leu Thr Val Ala		
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Tyr Ala Leu Thr Pro Tyr Thr Glu Ala Ala Leu Val Arg Asp Asp Val		
	20	25 30
Asp Tyr Gln Ile Phe Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Ser		
	35	40 45
Val Gly Ala Thr Asn Val Leu Val Lys Asp Lys Asn Asn Lys Asp Leu		
	50	55 60
Gly Thr Ala Leu Pro Asn Gly Ile Pro Met Ile Asp Phe Ser Val Val		
65	70	75 80
Asp Val Asp Lys Arg Ile Ala Thr Leu Ile Asn Pro Gln Tyr Val Val		
	85	90 95
Gly Val Lys His Val Ser Asn Gly Val Ser Glu Leu His Phe Gly Asn		
	100	105 110
Leu Asn Gly Asn Met Asn Asn Gly Asn Ala Lys Ala His Arg Asp Val		
	115	120 125
Ser Ser Glu Glu Asn Arg Tyr Phe Ser Val Glu Lys Asn Glu Tyr Pro		
	130	135 140

Thr Lys Leu Asn Gly Lys Thr Val Thr Thr Glu Asp Gln Thr Gln Lys
 145 150 155 160

Arg Arg Glu Asp Tyr Tyr Met Pro Arg Leu Asp Lys Phe Val Thr Glu
 165 170 175

Val Ala Pro Ile Glu Ala Ser Thr Ala Ser Ser Asp Ala Gly Thr Tyr
 180 185 190

Asn Asp Gln Asn Lys Tyr Pro Ala Phe Val Arg Leu Gly Ser Gly Ser
 195 200 205

Gln Phe Ile Tyr Lys Lys Gly Asp Asn Tyr Ser Leu Ile Leu Asn Asn
 210 215 220

His Glu Val Gly Gly Asn Asn Leu Lys Leu Val Gly Asp Ala Tyr Thr
 225 230 235 240

Tyr Gly Ile Ala Gly Thr Pro Tyr Lys Val Asn His Glu Asn Asn Gly
 245 250 255

Leu Ile Gly Phe Gly Asn Ser Lys Glu Glu His Ser Asp Pro Lys Gly
 260 265 270

Ile Leu Ser Gln Asp Pro Leu Thr Asn Tyr Ala Val Leu Gly Asp Ser
 275 280 285

Gly Ser Pro Leu Phe Val Tyr Asp Arg Glu Lys Gly Lys Trp Leu Phe
 290 295 300

Leu Gly Ser Tyr Asp Phe Trp Ala Gly Tyr Asn Lys Lys Ser Trp Gln
 305 310 315 320

Glu Trp Asn Ile Tyr Lys Ser Gln Phe Thr Lys Asp Val Leu Asn Lys
 325 330 335

Asp Ser Ala Gly Ser Leu Ile Gly Ser Lys Thr Asp Tyr Ser Trp Ser
 340 345 350

Ser Asn Gly Lys Thr Ser Thr Ile Thr Gly Gly Glu Lys Ser Leu Asn
 355 360 365

Val Asp Leu Ala Asp Gly Lys Asp Lys Pro Asn His Gly Lys Ser Val
370 375 380

Thr Phe Glu Gly Ser Gly Thr Leu Thr Leu Asn Asn Asn Ile Asp Gln
385 390 395 400

Gly Ala Gly Gly Leu Phe Phe Glu Gly Asp Tyr Glu Val Lys Gly Thr
405 410 415

Ser Asp Asn Thr Thr Trp Lys Gly Ala Gly Val Ser Val Ala Glu Gly
420 425 430

Lys Thr Val Thr Trp Lys Val His Asn Pro Gln Tyr Asp Arg Leu Ala
435 440 445

Lys Ile Gly Lys Gly Thr Leu Ile Val Glu Gly Thr Gly Asp Asn Lys
450 455 460

Gly Ser Leu Lys Val Gly Asp Gly Thr Val Ile Leu Lys Gln Gln Thr
465 470 475 480

Asn Gly Ser Gly Gln His Ala Phe Ala Ser Val Gly Ile Val Ser Gly
485 490 495

Arg Ser Thr Leu Val Leu Asn Asp Asp Lys Gln Val Asp Pro Asn Ser
500 505 510

Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly Asn Ser
515 520 525

Leu Thr Phe Asp His Ile Arg Asn Ile Asp Asp Gly Ala Arg Leu Val
530 535 540

Asn His Asn Met Thr Asn Ala Ser Asn Ile Thr Ile Thr Gly Glu Ser
545 550 555 560

Leu Ile Thr Asp Pro Asn Thr Ile Thr Pro Tyr Asn Ile Asp Ala Pro
565 570 575

Asp Glu Asp Asn Pro Tyr Ala Phe Arg Arg Ile Lys Asp Gly Gly Gln
580 585 590

Leu Tyr Leu Asn Leu Glu Asn Tyr Thr Tyr Tyr Ala Leu Arg Lys Gly

595

600

605

Ala Ser Thr Arg Ser Glu Leu Pro Lys Asn Ser Gly Glu Ser Asn Glu
610 615 620

Asn Trp Leu Tyr Met Gly Lys Thr Ser Asp Glu Ala Lys Arg Asn Val
625 630 635 640

Met Asn His Ile Asn Asn Glu Arg Met Asn Gly Phe Asn Gly Tyr Phe
645 650 655

Gly Glu Glu Glu Gly Lys Asn Asn Gly Asn Leu Asn Val Thr Phe Lys
660 665 670

Gly Lys Ser Glu Gln Asn Arg Phe Leu Leu Thr Gly Gly Thr Asn Leu
675 680 685

Asn Gly Asp Leu Thr Val Glu Lys Gly Thr Leu Phe Leu Ser Gly Arg
690 695 700

Pro Thr Pro His Ala Arg Asp Ile Ala Gly Ile Ser Ser Thr Lys Lys
705 710 715 720

Asp Pro His Phe Ala Glu Asn Asn Glu Val Val Val Glu Asp Asp Trp
725 730 735

Ile Asn Arg Asn Phe Lys Ala Thr Thr Met Asn Val Thr Gly Asn Ala
740 745 750

Ser Leu Tyr Ser Gly Arg Asn Val Ala Asn Ile Thr Ser Asn Ile Thr
755 760 765

Ala Ser Asn Lys Ala Gln Val His Ile Gly Tyr Lys Thr Gly Asp Thr
770 775 780

Val Cys Val Arg Ser Asp Tyr Thr Gly Tyr Val Thr Cys Thr Thr Asp
785 790 795 800

Lys Leu Ser Asp Lys Ala Leu Asn Ser Phe Asn Pro Thr Asn Leu Arg
805 810 815

Gly Asn Val Asn Leu Thr Glu Ser Ala Asn Phe Val Leu Gly Lys Ala
820 825 830

Asn Leu Phe Gly Thr Ile Gln Ser Arg Gly Asn Ser Gln Val Arg Leu
835 840 845

Thr Glu Asn Ser His Trp His Leu Thr Gly Asn Ser Asp Val His Gln
850 855 860

Leu Asp Leu Ala Asn Gly His Ile His Leu Asn Ser Ala Asp Asn Ser
865 870 875 880

Asn Asn Val Thr Lys Tyr Asn Thr Leu Thr Val Asn Ser Leu Ser Gly
885 890 895

Asn Gly Ser Phe Tyr Tyr Leu Thr Asp Leu Ser Asn Lys Gln Gly Asp
900 905 910

Lys Val Val Val Thr Lys Ser Ala Thr Gly Asn Phe Thr Leu Gln Val
915 920 925

Ala Asp Lys Thr Gly Glu Pro Asn His Asn Glu Leu Thr Leu Phe Asp
930 935 940

Ala Ser Lys Ala Gln Arg Asp His Leu Asn Val Ser Leu Val Gly Asn
945 950 955 960

Thr Val Asp Leu Gly Ala Trp Lys Tyr Lys Leu Arg Asn Val Asn Gly
965 970 975

Arg Tyr Asp Leu Tyr Asn Pro Glu Val Glu Lys Arg Asn Gln Thr Val
980 985 990

Asp Thr Thr Asn Ile Thr Thr Pro Asn Asn Ile Gln Ala Asp Val Pro
995 1000 1005

Ser Val Pro Ser Asn Asn Glu Glu Ile Ala Arg Val Asp Glu Ala
1010 1015 1020

Pro Val Pro Pro Pro Ala Pro Ala Thr Pro Ser Glu Thr Thr Glu
1025 1030 1035

Thr Val Ala Glu Asn Ser Lys Gln Glu Ser Lys Thr Val Glu Lys
1040 1045 1050

Asn Glu Gln Asp Ala Thr Glu Thr Thr Ala Gln Asn Arg Glu Val		
1055	1060	1065
Ala Lys Glu Ala Lys Ser Asn Val Lys Ala Asn Thr Gln Thr Asn		
1070	1075	1080
Glu Val Ala Gln Ser Gly Ser Glu Thr Lys Glu Thr Gln Thr Thr		
1085	1090	1095
Glu Thr Lys Glu Thr Ala Thr Val Glu Lys Glu Glu Lys Ala Lys		
1100	1105	1110
Val Glu Thr Glu Lys Thr Gln Glu Val Pro Lys Val Thr Ser Gln		
1115	1120	1125
Val Ser Pro Lys Gln Glu Gln Ser Glu Thr Val Gln Pro Gln Ala		
1130	1135	1140
Glu Pro Ala Arg Glu Asn Asp Pro Thr Val Asn Ile Lys Glu Pro		
1145	1150	1155
Gln Ser Gln Thr Asn Thr Thr Ala Asp Thr Glu Gln Pro Ala Lys		
1160	1165	1170
Glu Thr Ser Ser Asn Val Glu Gln Pro Val Thr Glu Ser Thr Thr		
1175	1180	1185
Val Asn Thr Gly Asn Ser Val Val Glu Asn Pro Glu Asn Thr Thr		
1190	1195	1200
Pro Ala Thr Thr Gln Pro Thr Val Asn Ser Glu Ser Ser Asn Lys		
1205	1210	1215
Pro Lys Asn Arg His Arg Arg Ser Val Arg Ser Val Pro His Asn		
1220	1225	1230
Val Glu Pro Ala Thr Thr Ser Ser Asn Asp Arg Ser Thr Val Ala		
1235	1240	1245
Leu Cys Asp Leu Thr Ser Thr Asn Thr Asn Ala Val Leu Ser Asp		
1250	1255	1260

Ala	Arg	Ala	Lys	Ala	Gln	Phe	Val	Ala	Leu	Asn	Val	Gly	Lys	Ala
1265						1270					1275			
Val	Ser	Gln	His	Ile	Ser	Gln	Leu	Glu	Met	Asn	Asn	Glu	Gly	Gln
1280						1285					1290			
Tyr	Asn	Val	Trp	Val	Ser	Asn	Thr	Ser	Met	Asn	Lys	Asn	Tyr	Ser
1295						1300					1305			
Ser	Ser	Gln	Tyr	Arg	Arg	Phe	Ser	Ser	Lys	Ser	Thr	Gln	Thr	Gln
1310						1315					1320			
Leu	Gly	Trp	Asp	Gln	Thr	Ile	Ser	Asn	Asn	Val	Gln	Leu	Gly	Gly
1325						1330					1335			
Val	Phe	Thr	Tyr	Val	Arg	Asn	Ser	Asn	Asn	Phe	Asp	Lys	Ala	Thr
1340						1345					1350			
Ser	Lys	Asn	Thr	Leu	Ala	Gln	Val	Asn	Phe	Tyr	Ser	Lys	Tyr	Tyr
1355						1360					1365			
Ala	Asp	Asn	His	Trp	Tyr	Leu	Gly	Ile	Asp	Leu	Gly	Tyr	Gly	Lys
1370						1375					1380			
Phe	Gln	Ser	Lys	Leu	Gln	Thr	Asn	His	Asn	Ala	Lys	Phe	Ala	Arg
1385						1390					1395			
His	Thr	Ala	Gln	Phe	Gly	Leu	Thr	Ala	Gly	Lys	Ala	Phe	Asn	Leu
1400						1405					1410			
Gly	Asn	Phe	Gly	Ile	Thr	Pro	Ile	Val	Gly	Val	Arg	Tyr	Ser	Tyr
1415						1420					1425			
Leu	Ser	Asn	Ala	Asp	Phe	Ala	Leu	Asp	Gln	Ala	Arg	Ile	Lys	Val
1430						1435					1440			
Asn	Pro	Ile	Ser	Val	Lys	Thr	Ala	Phe	Ala	Gln	Val	Asp	Leu	Ser
1445						1450					1455			
Tyr	Thr	Tyr	His	Leu	Gly	Glu	Phe	Ser	Val	Thr	Pro	Ile	Leu	Ser
1460						1465					1470			
Ala	Arg	Tyr	Asp	Ala	Asn	Gln	Gly	Ser	Gly	Lys	Ile	Asn	Val	Asn

1475		1480		1485
Gly Tyr Asp Phe Ala Tyr Asn Val Glu Asn Gln Gln Gln Tyr Asn				
1490		1495		1500
Ala Gly Leu Lys Leu Lys Tyr His Asn Val Lys Leu Ser Leu Ile				
1505		1510		1515
Gly Gly Leu Thr Lys Ala Lys Gln Ala Glu Lys Gln Lys Thr Ala				
1520		1525		1530
Glu Leu Lys Leu Ser Phe Ser Phe				
1535		1540		
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Met Leu Asn Lys Lys Phe Lys Leu Asn Phe Ile Ala Leu Thr Val Ala				
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Tyr Ala Leu Thr Pro Tyr Thr Glu Ala Ala Leu Val Arg Asp Asp Val				
	20	25		30
Asp Tyr Gln Ile Phe Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Ser				
35		40		45
Val Gly Ala Thr Asn Val Glu Val Arg Asp Lys Asn Asn Arg Pro Leu				
50		55		60
Gly Asn Val Leu Pro Asn Gly Ile Pro Met Ile Asp Phe Ser Val Val				
65		70		75
Asp Val Asp Lys Arg Ile Ala Thr Leu Val Asn Pro Gln Tyr Val Val				
	85	90		95
Gly Val Lys His Val Ser Asn Gly Val Ser Glu Leu His Phe Gly Asn				
	100	105		110
Leu Asn Gly Asn Met Asn Asn Gly Asn Ala Lys Ala His Arg Asp Val				
115		120		125

Ser Ser Glu Glu Asn Arg Tyr Tyr Thr Val Glu Lys Asn Glu Tyr Pro
 130 135 140

Thr Lys Leu Asn Gly Lys Ala Val Thr Thr Glu Asp Gln Ala Gln Lys
 145 150 155 160

Arg Arg Glu Asp Tyr Tyr Met Pro Arg Leu Asp Lys Phe Val Thr Glu
 165 170 175

Val Ala Pro Ile Glu Ala Ser Thr Asp Ser Ser Thr Ala Gly Thr Tyr
 180 185 190

Asn Asn Lys Asp Lys Tyr Pro Tyr Phe Val Arg Leu Gly Ser Gly Thr
 195 200 205

Gln Phe Ile Tyr Glu Asn Gly Thr Arg Tyr Glu Leu Trp Leu Gly Lys
 210 215 220

Glu Gly Gln Lys Ser Asp Ala Gly Gly Tyr Asn Leu Lys Leu Val Gly
 225 230 235 240

Asn Ala Tyr Thr Tyr Gly Ile Ala Gly Thr Pro Tyr Glu Val Asn His
 245 250 255

Glu Asn Asp Gly Leu Ile Gly Phe Gly Asn Ser Asn Asn Glu Tyr Ile
 260 265 270

Asn Pro Lys Glu Ile Leu Ser Lys Lys Pro Leu Thr Asn Tyr Ala Val
 275 280 285

Leu Gly Asp Ser Gly Ser Pro Leu Phe Val Tyr Asp Arg Glu Lys Gly
 290 295 300

Lys Trp Leu Phe Leu Gly Ser Tyr Asp Tyr Trp Ala Gly Tyr Asn Lys
 305 310 315 320

Lys Ser Trp Gln Glu Trp Asn Ile Tyr Lys Pro Glu Phe Ala Glu Lys
 325 330 335

Ile Tyr Glu Gln Tyr Ser Ala Gly Ser Leu Ile Gly Ser Lys Thr Asp
 340 345 350

Tyr Ser Trp Ser Ser Asn Gly Lys Thr Ser Thr Ile Thr Gly Gly Glu
 355 360 365

Lys Ser Leu Asn Val Asp Leu Ala Asp Gly Lys Asp Lys Pro Asn His
 370 375 380

Gly Lys Ser Val Thr Phe Glu Gly Ser Gly Thr Leu Thr Leu Asn Asn
 385 390 395 400

Asn Ile Asp Gln Gly Ala Gly Gly Leu Phe Phe Glu Gly Asp Tyr Glu
 405 410 415

Val Lys Gly Thr Ser Asp Asn Thr Thr Trp Lys Gly Ala Gly Val Ser
 420 425 430

Val Ala Glu Gly Lys Thr Val Thr Trp Lys Val His Asn Pro Gln Tyr
 435 440 445

Asp Arg Leu Ala Lys Ile Gly Lys Gly Thr Leu Ile Val Glu Gly Thr
 450 455 460

Gly Asp Asn Lys Gly Ser Leu Lys Val Gly Asp Gly Thr Val Ile Leu
 465 470 475 480

Lys Gln Gln Thr Asn Gly Ser Gly Gln His Ala Phe Ala Ser Val Gly
 485 490 495

Ile Val Ser Gly Arg Ser Thr Leu Val Leu Asn Asp Asp Lys Gln Val
 500 505 510

Asp Pro Asn Ser Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp Leu
 515 520 525

Asn Gly Asn Ser Leu Thr Phe Asp His Ile Arg Asn Ile Asp Glu Gly
 530 535 540

Ala Arg Leu Val Asn His Ser Thr Ser Lys His Ser Thr Val Thr Ile
 545 550 555 560

Thr Gly Asp Asn Leu Ile Thr Asp Pro Asn Asn Val Ser Ile Tyr Tyr
 565 570 575

Val Lys Pro Leu Glu Asp Asp Asn Pro Tyr Ala Ile Arg Gln Ile Lys

580

585

590

Tyr Gly Tyr Gln Leu Tyr Phe Asn Glu Glu Asn Arg Thr Tyr Tyr Ala
595 600 605

Leu Lys Lys Asp Ala Ser Ile Arg Ser Glu Phe Pro Gln Asn Arg Gly
610 615 620

Glu Ser Asn Asn Ser Trp Leu Tyr Met Gly Thr Glu Lys Ala Asp Ala
625 630 635 640

Gln Lys Asn Ala Met Asn His Ile Asn Asn Glu Arg Met Asn Gly Phe
645 650 655

Asn Gly Tyr Phe Gly Glu Glu Glu Gly Lys Asn Asn Gly Asn Leu Asn
660 665 670

Val Thr Phe Lys Gly Lys Ser Glu Gln Asn Arg Phe Leu Leu Thr Gly
675 680 685

Gly Thr Asn Leu Asn Gly Asp Leu Asn Val Gln Gln Gly Thr Leu Phe
690 695 700

Leu Ser Gly Arg Pro Thr Pro His Ala Arg Asp Ile Ala Gly Ile Ser
705 710 715 720

Ser Thr Lys Lys Asp Ser His Phe Ser Glu Asn Asn Glu Val Val Val
725 730 735

Glu Asp Asp Trp Ile Asn Arg Asn Phe Lys Ala Thr Asn Ile Asn Val
740 745 750

Thr Asn Asn Ala Thr Leu Tyr Ser Gly Arg Asn Val Glu Ser Ile Thr
755 760 765

Ser Asn Ile Thr Ala Ser Asn Asn Ala Lys Val His Ile Gly Tyr Lys
770 775 780

Ala Gly Asp Thr Val Cys Val Arg Ser Asp Tyr Thr Gly Tyr Val Thr
785 790 795 800

Cys Thr Thr Asp Lys Leu Ser Asp Lys Ala Leu Asn Ser Phe Asn Pro
805 810 815

Thr Asn Leu Arg Gly Asn Val Asn Leu Thr Glu Ser Ala Asn Phe Val
820 825 830

Leu Gly Lys Ala Asn Leu Phe Gly Thr Ile Gln Ser Arg Gly Asn Ser
835 840 845

Gln Val Arg Leu Thr Glu Asn Ser His Trp His Leu Thr Gly Asn Ser
850 855 860

Asp Val His Gln Leu Asp Leu Ala Asn Gly His Ile His Leu Asn Ser
865 870 875 880

Ala Asp Asn Ser Asn Asn Val Thr Lys Tyr Asn Thr Leu Thr Val Asn
885 890 895

Ser Leu Ser Gly Asn Gly Ser Phe Tyr Tyr Leu Thr Asp Leu Ser Asn
900 905 910

Lys Gln Gly Asp Lys Val Val Val Thr Lys Ser Ala Thr Gly Asn Phe
915 920 925

Thr Leu Gln Val Ala Asp Lys Thr Gly Glu Pro Asn His Asn Glu Leu
930 935 940

Thr Leu Phe Asp Ala Ser Lys Ala Gln Arg Asp His Leu Asn Val Ser
945 950 955 960

Leu Val Gly Asn Thr Val Asp Leu Gly Ala Trp Lys Tyr Lys Leu Arg
965 970 975

Asn Val Asn Gly Arg Tyr Asp Leu Tyr Asn Pro Glu Val Glu Lys Arg
980 985 990

Asn Gln Thr Val Asp Thr Thr Asn Ile Thr Thr Pro Asn Asn Ile Gln
995 1000 1005

Ala Asp Val Pro Ser Val Pro Ser Asn Asn Glu Glu Ile Ala Arg
1010 1015 1020

Val Asp Glu Ala Pro Val Pro Pro Pro Ala Pro Ala Thr Pro Ser
1025 1030 1035

Ser	Thr	Val	Ala	Leu	Cys	Asp	Leu	Thr	Ser	Thr	Asn	Thr	Asn	Ala
1250						1255					1260			
Val	Leu	Ser	Asp	Ala	Arg	Ala	Lys	Ala	Gln	Phe	Val	Ala	Leu	Asn
1265						1270					1275			
Val	Gly	Lys	Ala	Val	Ser	Gln	His	Ile	Ser	Gln	Leu	Glu	Met	Asn
1280						1285					1290			
Asn	Glu	Gly	Gln	Tyr	Asn	Val	Trp	Val	Ser	Asn	Thr	Ser	Met	Asn
1295						1300					1305			
Lys	Asn	Tyr	Ser	Ser	Ser	Gln	Tyr	Arg	Arg	Phe	Ser	Ser	Lys	Ser
1310						1315					1320			
Thr	Gln	Thr	Gln	Leu	Gly	Trp	Asp	Gln	Thr	Ile	Ser	Asn	Asn	Val
1325						1330					1335			
Gln	Leu	Gly	Gly	Val	Phe	Thr	Tyr	Val	Arg	Asn	Ser	Asn	Asn	Phe
1340						1345					1350			
Asp	Lys	Ala	Thr	Ser	Lys	Asn	Thr	Leu	Ala	Gln	Val	Asn	Phe	Tyr
1355						1360					1365			
Ser	Lys	Tyr	Tyr	Ala	Asp	Asn	His	Trp	Tyr	Leu	Gly	Ile	Asp	Leu
1370						1375					1380			
Gly	Tyr	Gly	Lys	Phe	Gln	Ser	Lys	Leu	Gln	Thr	Asn	His	Asn	Ala
1385						1390					1395			
Lys	Phe	Ala	Arg	His	Thr	Ala	Gln	Phe	Gly	Leu	Thr	Ala	Gly	Lys
1400						1405					1410			
Ala	Phe	Asn	Leu	Gly	Asn	Phe	Gly	Ile	Thr	Pro	Ile	Val	Gly	Val
1415						1420					1425			
Arg	Tyr	Ser	Tyr	Leu	Ser	Asn	Ala	Asp	Phe	Ala	Leu	Asp	Gln	Ala
1430						1435					1440			
Arg	Ile	Lys	Val	Asn	Pro	Ile	Ser	Val	Lys	Thr	Ala	Phe	Ala	Gln
1445						1450					1455			
Val	Asp	Leu	Ser	Tyr	Thr	Tyr	His	Leu	Gly	Glu	Phe	Ser	Val	Thr

1460		1465		1470
Pro Ile Leu Ser Ala Arg Tyr Asp Ala Asn Gln Gly Ser Gly Lys				
1475		1480		1485
Ile Asn Val Asn Gly Tyr Asp Phe Ala Tyr Asn Val Glu Asn Gln				
1490		1495		1500
Gln Gln Tyr Asn Ala Gly Leu Lys Leu Lys Tyr His Asn Val Lys				
1505		1510		1515
Leu Ser Leu Ile Gly Gly Leu Thr Lys Ala Lys Gln Ala Glu Lys				
1520		1525		1530
Gln Lys Thr Ala Glu Leu Lys Leu Ser Phe Ser Phe				
1535		1540		1545
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Tyr Ala Leu Thr Pro Tyr Thr Glu Ala Ala Leu Val Arg Asp Asp Val				
	20		25	30
Asp Tyr Gln Ile Phe Arg Asp Phe Ala Glu Asn Lys Gly Arg Phe Ser				
	35		40	45
Val Gly Ala Thr Asn Val Glu Val Arg Asp Lys Asn Asn His Ser Leu				
	50		55	60
Gly Asn Val Leu Pro Asn Gly Ile Pro Met Ile Asp Phe Ser Val Val				
65		70		75
Asp Val Asp Lys Arg Ile Ala Thr Leu Ile Asn Pro Gln Tyr Val Val				
	85		90	95
Gly Val Lys His Val Ser Asn Gly Val Ser Glu Leu His Phe Gly Asn				
	100		105	110

Leu Asn Gly Asn Met Asn Asn Gly Asn Asp Lys Ser His Arg Asp Val
 115 120 125

Ser Ser Glu Glu Asn Arg Tyr Phe Ser Val Glu Lys Asn Glu Tyr Pro
 130 135 140

Thr Lys Leu Asn Gly Lys Ala Val Thr Thr Glu Asp Gln Thr Gln Lys
 145 150 155 160

Arg Arg Glu Asp Tyr Tyr Met Pro Arg Leu Asp Lys Phe Val Thr Glu
 165 170 175

Val Ala Pro Ile Glu Ala Ser Thr Ala Ser Ser Asp Ala Gly Thr Tyr
 180 185 190

Asn Asp Gln Asn Lys Tyr Pro Ala Phe Val Arg Leu Gly Ser Gly Thr
 195 200 205

Gln Phe Ile Tyr Lys Lys Gly Asp Asn Tyr Ser Leu Ile Leu Asn Asn
 210 215 220

His Glu Val Gly Gly Asn Asn Leu Lys Leu Val Gly Asp Ala Tyr Thr
 225 230 235 240

Tyr Gly Ile Ala Gly Thr Pro Tyr Lys Val Asn His Glu Asn Asn Gly
 245 250 255

Leu Ile Gly Phe Gly Asn Ser Lys Glu Glu His Ser Asp Pro Lys Gly
 260 265 270

Ile Leu Ser Gln Asp Pro Leu Thr Asn Tyr Ala Val Leu Gly Asp Ser
 275 280 285

Gly Ser Pro Leu Phe Val Tyr Asp Arg Glu Lys Gly Lys Trp Leu Phe
 290 295 300

Leu Gly Ser Tyr Asp Phe Trp Ala Gly Tyr Asn Lys Lys Ser Trp Gln
 305 310 315 320

Glu Trp Asn Ile Tyr Lys Pro Glu Phe Ala Lys Thr Val Leu Asp Lys
 325 330 335

Asp Thr Ala Gly Ser Leu Ile Gly Ser Asn Thr Gln Tyr Asn Trp Asn
340 345 350

Pro Thr Gly Lys Thr Ser Val Ile Ser Asn Gly Ser Glu Ser Leu Asn
355 360 365

Val Asp Leu Phe Asp Ser Ser Gln Asp Thr Asp Ser Lys Lys Asn Asn
370 375 380

His Gly Lys Ser Val Thr Leu Arg Gly Ser Gly Thr Leu Thr Leu Asn
385 390 395 400

Asn Asn Ile Asp Gln Gly Ala Gly Gly Leu Phe Phe Glu Gly Asp Tyr
405 410 415

Glu Val Lys Gly Thr Ser Asp Ser Thr Thr Trp Lys Gly Ala Gly Val
420 425 430

Ser Val Ala Asp Gly Lys Thr Val Thr Trp Lys Val His Asn Pro Lys
435 440 445

Ser Asp Arg Leu Ala Lys Ile Gly Lys Gly Thr Leu Ile Val Glu Gly
450 455 460

Lys Gly Glu Asn Lys Gly Ser Leu Lys Val Gly Asp Gly Thr Val Ile
465 470 475 480

Leu Lys Gln Gln Ala Asp Ala Asn Asn Lys Val Lys Ala Phe Ser Gln
485 490 495

Val Gly Ile Val Ser Gly Arg Ser Thr Val Val Leu Asn Asp Asp Lys
500 505 510

Gln Val Asp Pro Asn Ser Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu
515 520 525

Asp Ala Asn Gly Asn Asn Leu Thr Phe Glu His Ile Arg Asn Ile Asp
530 535 540

Asp Gly Ala Arg Leu Val Asn His Asn Thr Ser Lys Thr Ser Thr Val
545 550 555 560

Thr Ile Thr Gly Glu Ser Leu Ile Thr Asp Pro Asn Thr Ile Thr Pro

565

570

575

Tyr Asn Ile Asp Ala Pro Asp Glu Asp Asn Pro Tyr Ala Phe Arg Arg
 580 585 590

Ile Lys Asp Gly Gly Gln Leu Tyr Leu Asn Leu Glu Asn Tyr Thr Tyr
 595 600 605

Tyr Ala Leu Arg Lys Gly Ala Ser Thr Arg Ser Glu Leu Pro Lys Asn
 610 615 620

Ser Gly Glu Ser Asn Glu Asn Trp Leu Tyr Met Gly Lys Thr Ser Asp
 625 630 635 640

Ala Ala Lys Arg Asn Val Met Asn His Ile Asn Asn Glu Arg Met Asn
 645 650 655

Gly Phe Asn Gly Tyr Phe Gly Glu Glu Glu Gly Lys Asn Asn Gly Asn
 660 665 670

Leu Asn Val Thr Phe Lys Gly Lys Ser Glu Gln Asn Arg Phe Leu Leu
 675 680 685

Thr Gly Gly Thr Asn Leu Asn Gly Asp Leu Lys Val Glu Lys Gly Thr
 690 695 700

Leu Phe Leu Ser Gly Arg Pro Thr Pro His Ala Arg Asp Ile Ala Gly
 705 710 715 720

Ile Ser Ser Thr Lys Lys Asp Gln His Phe Ala Glu Asn Asn Glu Val
 725 730 735

Val Val Glu Asp Asp Trp Ile Asn Arg Asn Phe Lys Ala Thr Asn Ile
 740 745 750

Asn Val Thr Asn Asn Ala Thr Leu Tyr Ser Gly Arg Asn Val Ala Asn
 755 760 765

Ile Thr Ser Asn Ile Thr Ala Ser Asp Asn Ala Lys Val His Ile Gly
 770 775 780

Tyr Lys Ala Gly Asp Thr Val Cys Val Arg Ser Asp Tyr Thr Gly Tyr
 785 790 795 800

Val Thr Cys Thr Thr Asp Lys Leu Ser Asp Lys Ala Leu Asn Ser Phe
805 810 815

Asn Ala Thr Asn Val Ser Gly Asn Val Asn Leu Ser Gly Asn Ala Asn
820 825 830

Phe Val Leu Gly Lys Ala Asn Leu Phe Gly Thr Ile Ser Gly Thr Gly
835 840 845

Asn Ser Gln Val Arg Leu Thr Glu Asn Ser His Trp His Leu Thr Gly
850 855 860

Asp Ser Asn Val Asn Gln Leu Asn Leu Asp Lys Gly His Ile His Leu
865 870 875 880

Asn Ala Gln Asn Asp Ala Asn Lys Val Thr Thr Tyr Asn Thr Leu Thr
885 890 895

Val Asn Ser Leu Ser Gly Asn Gly Ser Phe Tyr Tyr Leu Thr Asp Leu
900 905 910

Ser Asn Lys Gln Gly Asp Lys Val Val Val Thr Lys Ser Ala Thr Gly
915 920 925

Asn Phe Thr Leu Gln Val Ala Asp Lys Thr Gly Glu Pro Thr Lys Asn
930 935 940

Glu Leu Thr Leu Phe Asp Ala Ser Asn Ala Thr Arg Asn Asn Leu Asn
945 950 955 960

Val Ser Leu Val Gly Asn Thr Val Asp Leu Gly Ala Trp Lys Tyr Lys
965 970 975

Leu Arg Asn Val Asn Gly Arg Tyr Asp Leu Tyr Asn Pro Glu Val Glu
980 985 990

Lys Arg Asn Gln Thr Val Asp Thr Thr Asn Ile Thr Thr Pro Asn Asn
995 1000 1005

Ile Gln Ala Asp Val Pro Ser Val Pro Ser Asn Asn Glu Glu Ile
1010 1015 1020

Ala	Arg	Val	Glu	Thr	Pro	Val	Pro	Pro	Pro	Ala	Pro	Ala	Thr	Pro
1025						1030					1035			
Ser	Glu	Thr	Thr	Glu	Thr	Val	Ala	Glu	Asn	Ser	Lys	Gln	Glu	Ser
1040						1045					1050			
Lys	Thr	Val	Glu	Lys	Asn	Glu	Gln	Asp	Ala	Thr	Glu	Thr	Thr	Ala
1055						1060					1065			
Gln	Asn	Gly	Glu	Val	Ala	Glu	Glu	Ala	Lys	Pro	Ser	Val	Lys	Ala
1070						1075					1080			
Asn	Thr	Gln	Thr	Asn	Glu	Val	Ala	Gln	Ser	Gly	Ser	Glu	Thr	Glu
1085						1090					1095			
Glu	Thr	Gln	Thr	Thr	Glu	Ile	Lys	Glu	Thr	Ala	Lys	Val	Glu	Lys
1100						1105					1110			
Glu	Glu	Lys	Ala	Lys	Val	Glu	Lys	Glu	Glu	Lys	Ala	Lys	Val	Glu
1115						1120					1125			
Lys	Asp	Glu	Ile	Gln	Glu	Ala	Pro	Gln	Met	Ala	Ser	Glu	Thr	Ser
1130						1135					1140			
Pro	Lys	Gln	Ala	Lys	Pro	Ala	Pro	Lys	Glu	Val	Ser	Thr	Asp	Thr
1145						1150					1155			
Lys	Val	Glu	Glu	Thr	Gln	Val	Gln	Ala	Gln	Pro	Gln	Thr	Gln	Ser
1160						1165					1170			
Thr	Thr	Val	Ala	Ala	Ala	Glu	Ala	Thr	Ser	Pro	Asn	Ser	Lys	Pro
1175						1180					1185			
Ala	Glu	Glu	Thr	Gln	Pro	Ser	Glu	Lys	Thr	Asn	Ala	Glu	Pro	Val
1190						1195					1200			
Thr	Pro	Val	Val	Ser	Lys	Asn	Gln	Thr	Glu	Asn	Thr	Thr	Asp	Gln
1205						1210					1215			
Pro	Thr	Glu	Arg	Glu	Lys	Thr	Ala	Lys	Val	Glu	Thr	Glu	Lys	Thr
1220						1225					1230			

1445		1450		1455
Val Ser Asn Thr Ser Met	Asn Glu Asn Tyr Ser Ser	Ser Gln Tyr		
1460	1465	1470		
Arg Arg Phe Ser Ser Lys	Ser Thr Gln Thr Gln Leu	Gly Trp Asp		
1475	1480	1485		
Gln Thr Ile Ser Asn Asn	Val Gln Leu Gly Gly Val	Phe Thr Tyr		
1490	1495	1500		
Val Arg Asn Ser Asn Asn	Phe Asp Lys Ala Ser Ser	Lys Asn Thr		
1505	1510	1515		
Leu Ala Gln Val Asn Phe	Tyr Ser Lys Tyr Tyr Ala	Asp Asn His		
1520	1525	1530		
Trp Tyr Leu Gly Ile Asp	Leu Gly Tyr Gly Lys Phe	Gln Ser Asn		
1535	1540	1545		
Leu Lys Thr Asn His Asn	Ala Lys Phe Ala Arg His	Thr Ala Gln		
1550	1555	1560		
Phe Gly Leu Thr Ala Gly	Lys Ala Phe Asn Leu Gly	Asn Phe Gly		
1565	1570	1575		
Ile Thr Pro Ile Val Gly	Val Arg Tyr Ser Tyr Leu	Ser Asn Ala		
1580	1585	1590		
Asn Phe Ala Leu Ala Lys	Asp Arg Ile Lys Val Asn	Pro Ile Ser		
1595	1600	1605		
Val Lys Thr Ala Phe Ala	Gln Val Asp Leu Ser Tyr	Thr Tyr His		
1610	1615	1620		
Leu Gly Glu Phe Ser Val	Thr Pro Ile Leu Ser Ala	Arg Tyr Asp		
1625	1630	1635		
Thr Asn Gln Gly Ser Gly	Lys Ile Asn Val Asn Gln	Tyr Asp Phe		
1640	1645	1650		
Ala Tyr Asn Val Glu Asn	Gln Gln Gln Tyr Asn Ala	Gly Leu Lys		
1655	1660	1665		

Leu Lys Tyr His Asn Val Lys Leu Ser Leu Ile Gly Gly Leu Thr
 1670 1675 1680

Lys Ala Lys Gln Ala Glu Lys Gln Lys Thr Ala Glu Leu Lys Leu
 1685 1690 1695

Ser Phe Ser Phe
 1700

<210> 6
 <211> 1848
 <212> PRT
 <213> Haemophilus influenzae

<400> 6

Met Leu Asn Lys Lys Phe Lys Leu Asn Phe Ile Ala Leu Thr Val Ala
 1 5 10 15

Tyr Ala Leu Thr Pro Tyr Thr Glu Ala Ala Leu Val Arg Asp Asp Val
 20 25 30

Asp Tyr Gln Ile Phe Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Ser
 35 40 45

Val Gly Ala Thr Asn Val Glu Val Arg Asp Lys Lys Asn Gln Ser Leu
 50 55 60

Gly Ser Ala Leu Pro Asn Gly Ile Pro Met Ile Asp Phe Ser Val Val
 65 70 75 80

Asp Val Asp Lys Arg Ile Ala Thr Leu Val Asn Pro Gln Tyr Val Val
 85 90 95

Gly Val Lys His Val Ser Asn Gly Val Ser Glu Leu His Phe Gly Asn
 100 105 110

Leu Asn Gly Asn Met Asn Asn Gly Asn Ala Lys Ser His Arg Asp Val
 115 120 125

Ser Ser Glu Glu Asn Arg Tyr Tyr Thr Val Glu Lys Asn Asn Phe Pro
 130 135 140

Thr Glu Asn Val Thr Ser Phe Thr Lys Glu Glu Gln Asp Ala Gln Lys
 145 150 155 160

Arg Arg Glu Asp Tyr Tyr Met Pro Arg Leu Asp Lys Phe Val Thr Glu
 165 170 175

Val Ala Pro Ile Glu Ala Ser Thr Ala Asn Asn Asn Lys Gly Glu Tyr
 180 185 190

Asn Asn Ser Asp Lys Tyr Pro Ala Phe Val Arg Leu Gly Ser Gly Thr
 195 200 205

Gln Phe Ile Tyr Lys Lys Gly Ser Arg Tyr Gln Leu Ile Leu Thr Glu
 210 215 220

Lys Asp Lys Gln Gly Asn Leu Leu Arg Asn Trp Asp Val Gly Gly Asp
 225 230 235 240

Asn Leu Glu Leu Val Gly Asn Ala Tyr Thr Tyr Gly Ile Ala Gly Thr
 245 250 255

Pro Tyr Lys Val Asn His Glu Asn Asn Gly Leu Ile Gly Phe Gly Asn
 260 265 270

Ser Lys Glu Glu His Ser Asp Pro Lys Gly Ile Leu Ser Gln Asp Pro
 275 280 285

Leu Thr Asn Tyr Ala Val Leu Gly Asp Ser Gly Ser Pro Leu Phe Val
 290 295 300

Tyr Asp Arg Glu Lys Gly Lys Trp Leu Phe Leu Gly Ser Tyr Asp Phe
 305 310 315 320

Trp Ala Gly Tyr Asn Lys Lys Ser Trp Gln Glu Trp Asn Ile Tyr Lys
 325 330 335

His Glu Phe Ala Glu Lys Ile Tyr Gln Gln Tyr Ser Ala Gly Ser Leu
 340 345 350

Ile Gly Ser Asn Thr Gln Tyr Thr Trp Gln Ala Thr Gly Ser Thr Ser
 355 360 365

Thr Ile Thr Gly Gly Gly Glu Pro Leu Ser Val Asp Leu Thr Asp Gly

370

375

380

Lys Asp Lys Pro Asn His Gly Lys Ser Ile Thr Leu Lys Gly Ser Gly
 385 390 395 400

Thr Leu Thr Leu Asn Asn His Ile Asp Gln Gly Ala Gly Gly Leu Phe
 405 410 415

Phe Glu Gly Asp Tyr Glu Val Lys Gly Thr Ser Asp Ser Thr Thr Trp
 420 425 430

Lys Gly Ala Gly Val Ser Val Ala Asp Gly Lys Thr Val Thr Trp Lys
 435 440 445

Val His Asn Pro Lys Tyr Asp Arg Leu Ala Lys Ile Gly Lys Gly Thr
 450 455 460

Leu Val Val Glu Gly Lys Gly Lys Asn Glu Gly Leu Leu Lys Val Gly
 465 470 475 480

Asp Gly Thr Val Ile Leu Lys Gln Lys Ala Asp Ala Asn Asn Lys Val
 485 490 495

Gln Ala Phe Ser Gln Val Gly Ile Val Ser Gly Arg Ser Thr Leu Val
 500 505 510

Leu Asn Asp Asp Lys Gln Val Asp Pro Asn Ser Ile Tyr Phe Gly Phe
 515 520 525

Arg Gly Gly Arg Leu Asp Leu Asn Gly Asn Ser Leu Thr Phe Asp His
 530 535 540

Ile Arg Asn Ile Asp Asp Gly Ala Arg Val Val Asn His Asn Met Thr
 545 550 555 560

Asn Thr Ser Asn Ile Thr Ile Thr Gly Glu Ser Leu Ile Thr Asn Pro
 565 570 575

Asn Thr Ile Thr Ser Tyr Asn Ile Glu Ala Gln Asp Asp Asp His Pro
 580 585 590

Leu Arg Ile Arg Ser Ile Pro Tyr Arg Gln Leu Tyr Phe Asn Gln Asp
 595 600 605

Asn Arg Ser Tyr Tyr Thr Leu Lys Lys Gly Ala Ser Thr Arg Ser Glu
610 615 620

Leu Pro Gln Asn Ser Gly Glu Ser Asn Glu Asn Trp Leu Tyr Met Gly
625 630 635 640

Arg Thr Ser Asp Ala Ala Lys Arg Asn Val Met Asn His Ile Asn Asn
645 650 655

Glu Arg Met Asn Gly Phe Asn Gly Tyr Phe Gly Glu Glu Glu Thr Lys
660 665 670

Ala Thr Gln Asn Gly Lys Leu Asn Val Thr Phe Asn Gly Lys Ser Asp
675 680 685

Gln Asn Arg Phe Leu Leu Thr Gly Gly Thr Asn Leu Asn Gly Asp Leu
690 695 700

Asn Val Glu Lys Gly Thr Leu Phe Leu Ser Gly Arg Pro Thr Pro His
705 710 715 720

Ala Arg Asp Ile Ala Gly Ile Ser Ser Thr Lys Lys Asp Pro His Phe
725 730 735

Thr Glu Asn Asn Glu Val Val Val Glu Asp Asp Trp Ile Asn Arg Asn
740 745 750

Phe Lys Ala Thr Thr Met Asn Val Thr Gly Asn Ala Ser Leu Tyr Ser
755 760 765

Gly Arg Asn Val Ala Asn Ile Thr Ser Asn Ile Thr Ala Ser Asn Asn
770 775 780

Ala Gln Val His Ile Gly Tyr Lys Thr Gly Asp Thr Val Cys Val Arg
785 790 795 800

Ser Asp Tyr Thr Gly Tyr Val Thr Cys His Asn Ser Asn Leu Ser Glu
805 810 815

Lys Ala Leu Asn Ser Phe Asn Pro Thr Asn Leu Arg Gly Asn Val Asn
820 825 830

Leu Thr Glu Asn Ala Ser Phe Thr Leu Gly Lys Ala Asn Leu Phe Gly
835 840 845

Thr Ile Gln Ser Ile Gly Thr Ser Gln Val Asn Leu Lys Glu Asn Ser
850 855 860

His Trp His Leu Thr Gly Asn Ser Asn Val Asn Gln Leu Asn Leu Thr
865 870 875 880

Asn Gly His Ile His Leu Asn Ala Gln Asn Asp Ala Asn Lys Val Thr
885 890 895

Thr Tyr Asn Thr Leu Thr Val Asn Ser Leu Ser Gly Asn Gly Ser Phe
900 905 910

Tyr Tyr Trp Val Asp Phe Thr Asn Asn Lys Ser Asn Lys Val Val Val
915 920 925

Asn Lys Ser Ala Thr Gly Asn Phe Thr Leu Gln Val Ala Asp Lys Thr
930 935 940

Gly Glu Pro Asn His Asn Glu Leu Thr Leu Phe Asp Ala Ser Asn Ala
945 950 955 960

Thr Arg Asn Asn Leu Glu Val Thr Leu Ala Asn Gly Ser Val Asp Arg
965 970 975

Gly Ala Trp Lys Tyr Lys Leu Arg Asn Val Asn Gly Arg Tyr Asp Leu
980 985 990

Tyr Asn Pro Glu Val Glu Lys Arg Asn Gln Thr Val Asp Thr Thr Asn
995 1000 1005

Ile Thr Thr Pro Asn Asp Ile Gln Ala Asp Ala Pro Ser Ala Gln
1010 1015 1020

Ser Asn Asn Glu Glu Ile Ala Arg Val Glu Thr Pro Val Pro Pro
1025 1030 1035

Pro Ala Pro Ala Thr Glu Ser Ala Ile Ala Ser Glu Gln Pro Glu
1040 1045 1050

Thr	Arg	Pro	Ala	Glu	Thr	Ala	Gln	Pro	Ala	Met	Glu	Glu	Thr	Asn
1055						1060					1065			
Thr	Ala	Asn	Ser	Thr	Glu	Thr	Ala	Pro	Lys	Ser	Asp	Thr	Ala	Thr
1070						1075					1080			
Gln	Thr	Glu	Asn	Pro	Asn	Ser	Glu	Ser	Val	Pro	Ser	Glu	Thr	Thr
1085						1090					1095			
Glu	Lys	Val	Ala	Glu	Asn	Pro	Pro	Gln	Glu	Asn	Glu	Thr	Val	Ala
1100						1105					1110			
Lys	Asn	Glu	Gln	Glu	Ala	Thr	Glu	Pro	Thr	Pro	Gln	Asn	Gly	Glu
1115						1120					1125			
Val	Ala	Lys	Glu	Asp	Gln	Pro	Thr	Val	Glu	Ala	Asn	Thr	Gln	Thr
1130						1135					1140			
Asn	Glu	Ala	Thr	Gln	Ser	Glu	Gly	Lys	Thr	Glu	Glu	Thr	Gln	Thr
1145						1150					1155			
Ala	Glu	Thr	Lys	Ser	Glu	Pro	Thr	Glu	Ser	Val	Thr	Val	Ser	Glu
1160						1165					1170			
Asn	Gln	Pro	Glu	Lys	Thr	Val	Ser	Gln	Ser	Thr	Glu	Asp	Lys	Val
1175						1180					1185			
Val	Val	Glu	Lys	Glu	Glu	Lys	Ala	Lys	Val	Glu	Thr	Glu	Glu	Thr
1190						1195					1200			
Gln	Lys	Ala	Pro	Gln	Val	Thr	Ser	Lys	Glu	Pro	Pro	Lys	Gln	Ala
1205						1210					1215			
Glu	Pro	Ala	Pro	Glu	Glu	Val	Pro	Thr	Asp	Thr	Asn	Ala	Glu	Glu
1220						1225					1230			
Ala	Gln	Ala	Leu	Gln	Gln	Thr	Gln	Pro	Thr	Thr	Val	Ala	Ala	Ala
1235						1240					1245			
Glu	Thr	Thr	Ser	Pro	Asn	Ser	Lys	Pro	Ala	Glu	Glu	Thr	Gln	Gln
1250						1255					1260			
Pro	Ser	Glu	Lys	Thr	Asn	Ala	Glu	Pro	Val	Thr	Pro	Val	Val	Ser

1265		1270		1275
Glu Asn Thr Ala Thr Gln Pro Thr Glu Thr Glu Glu Thr Ala Lys				
1280		1285		1290
Val Glu Lys Glu Lys Thr Gln Glu Val Pro Gln Val Ala Ser Gln				
1295		1300		1305
Glu Ser Pro Lys Gln Glu Gln Pro Ala Ala Lys Pro Gln Ala Gln				
1310		1315		1320
Thr Lys Pro Gln Ala Glu Pro Ala Arg Glu Asn Val Leu Thr Thr				
1325		1330		1335
Lys Asn Val Gly Glu Pro Gln Pro Gln Ala Gln Pro Gln Thr Gln				
1340		1345		1350
Ser Thr Ala Val Pro Thr Thr Gly Glu Thr Ala Ala Asn Ser Lys				
1355		1360		1365
Pro Ala Ala Lys Pro Gln Ala Gln Ala Lys Pro Gln Thr Glu Pro				
1370		1375		1380
Ala Arg Glu Asn Val Ser Thr Val Asn Thr Lys Glu Pro Gln Ser				
1385		1390		1395
Gln Thr Ser Ala Thr Val Ser Thr Glu Gln Pro Ala Lys Glu Thr				
1400		1405		1410
Ser Ser Asn Val Glu Gln Pro Ala Pro Glu Asn Ser Ile Asn Thr				
1415		1420		1425
Gly Ser Ala Thr Thr Met Thr Glu Thr Ala Glu Lys Ser Asp Lys				
1430		1435		1440
Pro Gln Met Glu Thr Val Thr Glu Asn Asp Arg Gln Pro Glu Ala				
1445		1450		1455
Asn Thr Val Ala Asp Asn Ser Val Ala Asn Asn Ser Glu Ser Ser				
1460		1465		1470
Glu Ser Lys Ser Arg Arg Arg Arg Ser Val Ser Gln Pro Lys Glu				
1475		1480		1485

Thr	Ser	Ala	Glu	Glu	Thr	Thr	Val	Ala	Ser	Thr	Gln	Glu	Thr	Thr
1490						1495					1500			
Val	Asp	Asn	Ser	Val	Ser	Thr	Pro	Lys	Pro	Arg	Ser	Arg	Arg	Thr
1505						1510					1515			
Arg	Arg	Ser	Val	Gln	Thr	Asn	Ser	Tyr	Glu	Pro	Val	Glu	Leu	Pro
1520						1525					1530			
Thr	Glu	Asn	Ala	Glu	Asn	Ala	Glu	Asn	Val	Gln	Ser	Gly	Asn	Asn
1535						1540					1545			
Val	Ala	Asn	Ser	Gln	Pro	Ala	Leu	Arg	Asn	Leu	Thr	Ser	Lys	Asn
1550						1555					1560			
Thr	Asn	Ala	Val	Ile	Ser	Asn	Ala	Met	Ala	Lys	Ala	Gln	Phe	Val
1565						1570					1575			
Ala	Leu	Asn	Val	Gly	Lys	Ala	Val	Ser	Gln	His	Ile	Ser	Gln	Leu
1580						1585					1590			
Glu	Met	Asn	Asn	Glu	Gly	Gln	Tyr	Asn	Val	Trp	Ile	Ser	Asn	Thr
1595						1600					1605			
Ser	Met	Asn	Lys	Asn	Tyr	Ser	Ser	Glu	Gln	Tyr	Arg	Arg	Phe	Ser
1610						1615					1620			
Ser	Lys	Ser	Thr	Gln	Thr	Gln	Leu	Gly	Trp	Asp	Gln	Thr	Ile	Ser
1625						1630					1635			
Asn	Asn	Val	Gln	Leu	Gly	Gly	Val	Phe	Thr	Tyr	Val	Arg	Asn	Ser
1640						1645					1650			
Asn	Asn	Phe	Asp	Lys	Ala	Ser	Ser	Lys	Asn	Thr	Leu	Ala	Gln	Val
1655						1660					1665			
Asn	Phe	Tyr	Ser	Lys	Tyr	Tyr	Ala	Asp	Asn	His	Trp	Tyr	Leu	Gly
1670						1675					1680			
Ile	Asp	Leu	Gly	Tyr	Gly	Lys	Phe	Gln	Ser	Asn	Leu	Gln	Thr	Asn
1685						1690					1695			

Asn Asn Ala Lys Phe Ala Arg His Thr Ala Gln Ile Gly Leu Thr
 1700 1705 1710

Ala Gly Lys Ala Phe Asn Leu Gly Asn Phe Ala Val Lys Pro Thr
 1715 1720 1725

Val Gly Val Arg Tyr Ser Tyr Leu Ser Asn Ala Asp Phe Ala Leu
 1730 1735 1740

Ala Gln Asp Arg Ile Lys Val Asn Pro Ile Ser Val Lys Thr Ala
 1745 1750 1755

Phe Ala Gln Val Asp Leu Ser Tyr Thr Tyr His Leu Gly Glu Phe
 1760 1765 1770

Ser Ile Thr Pro Ile Leu Ser Ala Arg Tyr Asp Ala Asn Gln Gly
 1775 1780 1785

Asn Gly Lys Ile Asn Val Ser Val Tyr Asp Phe Ala Tyr Asn Val
 1790 1795 1800

Glu Asn Gln Gln Gln Tyr Asn Ala Gly Leu Lys Leu Lys Tyr His
 1805 1810 1815

Asn Val Lys Leu Ser Leu Ile Gly Gly Leu Thr Lys Ala Lys Gln
 1820 1825 1830

Ala Glu Lys Gln Lys Thr Ala Glu Val Lys Leu Ser Phe Ser Phe
 1835 1840 1845

<210> 7

<211> 1395

<212> PRT

<213> Haemophilus influenzae

<400> 7

Met Lys Lys Thr Val Phe Arg Leu Asn Phe Leu Thr Ala Cys Ile Ser
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Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile
 20 25 30

Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Thr

35

40

45

Val Gly Ala Gln Asn Ile Lys Val Tyr Asn Lys Gln Gly Gln Leu Val
50 55 60

Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val Ser
65 70 75 80

Arg Asn Gly Val Ala Ala Leu Val Glu Asn Gln Tyr Ile Val Ser Val
85 90 95

Ala His Asn Val Gly Tyr Thr Asp Val Asp Phe Gly Ala Glu Gly Asn
100 105 110

Asn Pro Asp Gln His Arg Phe Thr Tyr Lys Ile Val Lys Arg Asn Asn
115 120 125

Tyr Lys Lys Asp Asn Leu His Pro Tyr Glu Asp Asp Tyr His Asn Pro
130 135 140

Arg Leu His Lys Phe Val Thr Glu Ala Ala Pro Ile Asp Met Thr Ser
145 150 155 160

Asn Met Asn Gly Ser Thr Tyr Ser Asp Arg Thr Lys Tyr Pro Glu Arg
165 170 175

Val Arg Ile Gly Ser Gly Arg Gln Phe Trp Arg Asn Asp Gln Asp Lys
180 185 190

Gly Asp Gln Val Ala Gly Ala Tyr His Tyr Leu Thr Ala Gly Asn Thr
195 200 205

His Asn Gln Arg Gly Ala Gly Asn Gly Tyr Ser Tyr Leu Gly Gly Asp
210 215 220

Val Arg Lys Ala Gly Glu Tyr Gly Pro Leu Pro Ile Ala Gly Ser Lys
225 230 235 240

Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Ala Glu Lys Gln Lys
245 250 255

Trp Leu Ile Asn Gly Ile Leu Arg Glu Gly Asn Pro Phe Glu Gly Lys
260 265 270

Glu Asn Gly Phe Gln Leu Val Arg Lys Ser Tyr Phe Asp Glu Ile Phe
 275 280 285

Glu Arg Asp Leu His Thr Ser Leu Tyr Thr Arg Ala Gly Asn Gly Val
 290 295 300

Tyr Thr Ile Ser Gly Asn Asp Asn Gly Gln Gly Ser Ile Thr Gln Lys
 305 310 315 320

Ser Gly Ile Pro Ser Glu Ile Lys Ile Thr Leu Ala Asn Met Ser Leu
 325 330 335

Pro Leu Lys Glu Lys Asp Lys Val His Asn Pro Arg Tyr Asp Gly Pro
 340 345 350

Asn Ile Tyr Ser Pro Arg Leu Asn Asn Gly Glu Thr Leu Tyr Phe Met
 355 360 365

Asp Gln Lys Gln Gly Ser Leu Ile Phe Ala Ser Asp Ile Asn Gln Gly
 370 375 380

Ala Gly Gly Leu Tyr Phe Glu Gly Asn Phe Thr Val Ser Pro Asn Ser
 385 390 395 400

Asn Gln Thr Trp Gln Gly Ala Gly Ile His Val Ser Glu Asn Ser Thr
 405 410 415

Val Thr Trp Lys Val Asn Gly Val Glu His Asp Arg Leu Ser Lys Ile
 420 425 430

Gly Lys Gly Thr Leu His Val Gln Ala Lys Gly Glu Asn Lys Gly Ser
 435 440 445

Ile Ser Val Gly Asp Gly Lys Val Ile Leu Glu Gln Gln Ala Asp Asp
 450 455 460

Gln Gly Asn Lys Gln Ala Phe Ser Glu Ile Gly Leu Val Ser Gly Arg
 465 470 475 480

Gly Thr Val Gln Leu Asn Asp Asp Lys Gln Phe Asp Thr Asp Lys Phe
 485 490 495

Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu
 500 505 510

Thr Phe Lys Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn
 515 520 525

His Asn Thr Thr Gln Ala Ala Asn Val Thr Ile Thr Gly Asn Glu Ser
 530 535 540

Ile Val Leu Pro Asn Gly Asn Asn Ile Asn Lys Leu Asp Tyr Arg Lys
 545 550 555 560

Glu Ile Ala Tyr Asn Gly Trp Phe Gly Glu Thr Asp Lys Asn Lys His
 565 570 575

Asn Gly Arg Leu Asn Leu Ile Tyr Lys Pro Thr Thr Glu Asp Arg Thr
 580 585 590

Leu Leu Leu Ser Gly Gly Thr Asn Leu Lys Gly Asp Ile Thr Gln Thr
 595 600 605

Lys Gly Lys Leu Phe Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn
 610 615 620

His Leu Asn Lys Arg Trp Ser Glu Met Glu Gly Ile Pro Gln Gly Glu
 625 630 635 640

Ile Val Trp Asp His Asp Trp Ile Asn Arg Thr Phe Lys Ala Glu Asn
 645 650 655

Phe Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val Ser Ser
 660 665 670

Ile Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr Phe Gly
 675 680 685

Val Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp Trp Thr
 690 695 700

Gly Leu Thr Thr Cys Gln Lys Val Asp Leu Thr Asp Thr Lys Val Ile
 705 710 715 720

Asn Ser Ile Pro Lys Thr Gln Ile Asn Gly Ser Ile Asn Leu Thr Asp
725 730 735

Asn Ala Thr Ala Asn Val Lys Gly Leu Ala Lys Leu Asn Gly Asn Val
740 745 750

Thr Leu Thr Asn His Ser Gln Phe Thr Leu Ser Asn Asn Ala Thr Gln
755 760 765

Ile Gly Asn Ile Arg Leu Ser Asp Asn Ser Thr Ala Thr Val Asp Asn
770 775 780

Ala Asn Leu Asn Gly Asn Val His Leu Thr Asp Ser Ala Gln Phe Ser
785 790 795 800

Leu Lys Asn Ser His Phe Ser His Gln Ile Gln Gly Asp Lys Gly Thr
805 810 815

Thr Val Thr Leu Glu Asn Ala Thr Trp Thr Met Pro Ser Asp Thr Thr
820 825 830

Leu Gln Asn Leu Thr Leu Asn Asn Ser Thr Ile Thr Leu Asn Ser Ala
835 840 845

Tyr Ser Ala Ser Ser Asn Asn Thr Pro Arg Arg Arg Arg Arg Ser Leu
850 855 860

Glu Thr Glu Thr Thr Pro Thr Ser Ala Glu His Arg Phe Asn Thr Leu
865 870 875 880

Thr Val Asn Gly Lys Leu Ser Gly Gln Gly Thr Phe Gln Phe Thr Ser
885 890 895

Ser Leu Phe Gly Tyr Lys Ser Asp Lys Leu Lys Leu Ser Asn Asp Ala
900 905 910

Glu Gly Asp Tyr Ile Leu Ser Val Arg Asn Thr Gly Lys Glu Pro Glu
915 920 925

Thr Leu Glu Gln Leu Thr Leu Val Glu Ser Lys Asp Asn Gln Pro Leu
930 935 940

Ser Asp Lys Leu Lys Phe Thr Leu Glu Asn Asp His Val Asp Ala Gly

945

950

955

960

Ala Leu Arg Tyr Lys Leu Val Lys Asn Asp Gly Glu Phe Arg Leu His
 965 970 975

Asn Pro Ile Lys Glu Gln Glu Leu His Asn Asp Leu Val Arg Ala Glu
 980 985 990

Gln Ala Glu Arg Thr Leu Glu Ala Lys Gln Val Glu Pro Thr Ala Lys
 995 1000 1005

Thr Gln Thr Gly Glu Pro Lys Val Arg Ser Arg Arg Ala Ala Arg
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Ala Ala Phe Pro Asp Thr Leu Pro Asp Gln Ser Leu Leu Asn Ala
 1025 1030 1035

Leu Glu Ala Lys Gln Ala Glu Leu Thr Ala Glu Thr Gln Lys Ser
 1040 1045 1050

Lys Ala Lys Thr Lys Lys Val Arg Ser Lys Arg Ala Val Phe Ser
 1055 1060 1065

Asp Pro Leu Leu Asp Gln Ser Leu Phe Ala Leu Glu Ala Ala Leu
 1070 1075 1080

Glu Val Ile Asp Ala Pro Gln Gln Ser Glu Lys Asp Arg Leu Ala
 1085 1090 1095

Gln Glu Glu Ala Glu Lys Gln Arg Lys Gln Lys Asp Leu Ile Ser
 1100 1105 1110

Arg Tyr Ser Asn Ser Ala Leu Ser Glu Leu Ser Ala Thr Val Asn
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Ser Met Leu Ser Val Gln Asp Glu Leu Asp Arg Leu Phe Val Asp
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Gln Ala Gln Ser Ala Val Trp Thr Asn Ile Ala Gln Asp Lys Arg
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Arg Tyr Asp Ser Asp Ala Phe Arg Ala Tyr Gln Gln Lys Thr Asn
 1160 1165 1170

Leu	Arg	Gln	Ile	Gly	Val	Gln	Lys	Ala	Leu	Ala	Asn	Gly	Arg	Ile
1175						1180					1185			
Gly	Ala	Val	Phe	Ser	His	Ser	Arg	Ser	Asp	Asn	Thr	Phe	Asp	Glu
1190						1195					1200			
Gln	Val	Lys	Asn	His	Ala	Thr	Leu	Thr	Met	Met	Ser	Gly	Phe	Ala
1205						1210					1215			
Gln	Tyr	Gln	Trp	Gly	Asp	Leu	Gln	Phe	Gly	Val	Asn	Val	Gly	Thr
1220						1225					1230			
Gly	Ile	Ser	Ala	Ser	Lys	Met	Ala	Glu	Glu	Gln	Ser	Arg	Lys	Ile
1235						1240					1245			
His	Arg	Lys	Ala	Ile	Asn	Tyr	Gly	Val	Asn	Ala	Ser	Tyr	Gln	Phe
1250						1255					1260			
Arg	Leu	Gly	Gln	Leu	Gly	Ile	Gln	Pro	Tyr	Phe	Gly	Val	Asn	Arg
1265						1270					1275			
Tyr	Phe	Ile	Glu	Arg	Glu	Asn	Tyr	Gln	Ser	Glu	Glu	Val	Arg	Val
1280						1285					1290			
Lys	Thr	Pro	Ser	Leu	Ala	Phe	Asn	Arg	Tyr	Asn	Ala	Gly	Ile	Arg
1295						1300					1305			
Val	Asp	Tyr	Thr	Phe	Thr	Pro	Thr	Asp	Asn	Ile	Ser	Val	Lys	Pro
1310						1315					1320			
Tyr	Phe	Phe	Val	Asn	Tyr	Val	Asp	Val	Ser	Asn	Ala	Asn	Val	Gln
1325						1330					1335			
Thr	Thr	Val	Asn	Leu	Thr	Val	Leu	Gln	Gln	Pro	Phe	Gly	Arg	Tyr
1340						1345					1350			
Trp	Gln	Lys	Glu	Val	Gly	Leu	Lys	Ala	Glu	Ile	Leu	His	Phe	Gln
1355						1360					1365			
Ile	Ser	Ala	Phe	Ile	Ser	Lys	Ser	Gln	Gly	Ser	Gln	Leu	Gly	Lys
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Gln Gln Asn Val Gly Val Lys Leu Gly Tyr Arg Trp
 1385 1390 1395

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 <223> "n" at position 1702 can be any base.

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 tta ggg ata gta tcg caa gcg tgg gca ggt cat act tat ttt ggg att 96
 Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile
 20 25 30
 gac tac caa tat tat cgt gat ttt gcc gag aat gaa ggc aag ttt gca 144
 Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Glu Gly Lys Phe Ala
 35 40 45
 gtt ggg gct aaa aat att gat gtt tat aac aaa gaa ggg caa tta gtt 192
 Val Gly Ala Lys Asn Ile Asp Val Tyr Asn Lys Glu Gly Gln Leu Val
 50 55 60
 ggc aca tca atg aca aaa gcc ccg atg att gat ttc tca gtc gtt tcc 240
 Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val Ser
 65 70 75 80
 aga aat gga gtt gct gcc tta gta ggc gat cag tat att gtg agt gtg 288
 Arg Asn Gly Val Ala Ala Leu Val Gly Asp Gln Tyr Ile Val Ser Val
 85 90 95
 gca cat aat gta ggc tat acc aat gtg gat ttt ggt gct gaa gga caa 336
 Ala His Asn Val Gly Tyr Thr Asn Val Asp Phe Gly Ala Glu Gly Gln
 100 105 110
 aat cct gat caa cat cgt ttt act tat aaa att gtg aaa cgg aat aat 384
 Asn Pro Asp Gln His Arg Phe Thr Tyr Lys Ile Val Lys Arg Asn Asn
 115 120 125
 tat aat cac gat gcg aag cac cgc tat cta gat gac tac cat aat cca 432
 Tyr Asn His Asp Ala Lys His Arg Tyr Leu Asp Asp Tyr His Asn Pro

130	135	140	
cgt tta cat aaa ttt gta acg gat gcg gca cca att gat atg act tca			480
Arg Leu His Lys Phe Val Thr Asp Ala Ala Pro Ile Asp Met Thr Ser			
145	150	155	160
cat atg gat ggc aat aag tat gca aat aag gaa aaa tat cct gaa cga			528
His Met Asp Gly Asn Lys Tyr Ala Asn Lys Glu Lys Tyr Pro Glu Arg			
	165	170	175
gta cgc gtc gga tct gga gat cag tat tgg gat gac gat caa aac aac			576
Val Arg Val Gly Ser Gly Asp Gln Tyr Trp Asp Asp Asp Gln Asn Asn			
	180	185	190
aga act tat tta tct gac gga tat aat tat tta aca ggt ggg aat aca			624
Arg Thr Tyr Leu Ser Asp Gly Tyr Asn Tyr Leu Thr Gly Gly Asn Thr			
	195	200	205
tat aat caa agc ggt aga ggt gat gga tat tca tat gtg aga ggt gat			672
Tyr Asn Gln Ser Gly Arg Gly Asp Gly Tyr Ser Tyr Val Arg Gly Asp			
	210	215	220
att cgc aaa gtt ggc gat tat ggt cca tta ccg att gca agt tca ttc			720
Ile Arg Lys Val Gly Asp Tyr Gly Pro Leu Pro Ile Ala Ser Ser Phe			
225	230	235	240
ggg gac agt gga tct cca atg ttt att tat gat gct gaa aca caa aaa			768
Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Ala Glu Thr Gln Lys			
	245	250	255
tgg cta att aat gga gta ttg cgg gag ggg caa cct tat aca ggc gaa			816
Trp Leu Ile Asn Gly Val Leu Arg Glu Gly Gln Pro Tyr Thr Gly Glu			
	260	265	270
ttc gat gga ttt caa tta gcc cgt aaa tct ttc ctt gat gaa att ata			864
Phe Asp Gly Phe Gln Leu Ala Arg Lys Ser Phe Leu Asp Glu Ile Ile			
	275	280	285
cgc aaa gat caa cca aat ggt ttt tta acc cct aag ggg aat ggc gtt			912
Arg Lys Asp Gln Pro Asn Gly Phe Leu Thr Pro Lys Gly Asn Gly Val			
	290	295	300
tat acc att tct aaa agt gac gat ggg ata gga gtt gtt act tcg aaa			960
Tyr Thr Ile Ser Lys Ser Asp Asp Gly Ile Gly Val Val Thr Ser Lys			
305	310	315	320
att gga aaa cct cgt gaa ata cct tta gcg aac aac aaa tta aaa ata			1008
Ile Gly Lys Pro Arg Glu Ile Pro Leu Ala Asn Asn Lys Leu Lys Ile			
	325	330	335
gaa gat aaa gat act gtc tat aat aac aga tat aat ggt cct aat att			1056
Glu Asp Lys Asp Thr Val Tyr Asn Asn Arg Tyr Asn Gly Pro Asn Ile			
	340	345	350
tat tct cct caa tta aac aat ggc aag aat att tat ttt gga gat gaa			1104
Tyr Ser Pro Gln Leu Asn Asn Gly Lys Asn Ile Tyr Phe Gly Asp Glu			
	355	360	365

gaa tta gga tcc ata act tta acg act gat atc gat caa ggt gca ggc Glu Leu Gly Ser Ile Thr Leu Thr Thr Asp Ile Asp Gln Gly Ala Gly 370 375 380	1152
ggg ttg tat ttt gag ggg gat ttt ata gtt tcg cct acc aaa aat gaa Gly Leu Tyr Phe Glu Gly Asp Phe Ile Val Ser Pro Thr Lys Asn Glu 385 390 395 400	1200
acg tgg aaa ggt gcg ggc att cat gtc agt gaa att agt acc gtt act Thr Trp Lys Gly Ala Gly Ile His Val Ser Glu Ile Ser Thr Val Thr 405 410 415	1248
tgg aaa gta aac ggc gtg gaa aat gat cga ctt tct aaa atc ggt aaa Trp Lys Val Asn Gly Val Glu Asn Asp Arg Leu Ser Lys Ile Gly Lys 420 425 430	1296
gga aca tta cac gtt aaa gcc aaa ggg gaa aat aaa ggt tcg atc agc Gly Thr Leu His Val Lys Ala Lys Gly Glu Asn Lys Gly Ser Ile Ser 435 440 445	1344
gta ggc gat ggt aaa gtc att ttg gag cag cag gca gac gat caa ggc Val Gly Asp Gly Lys Val Ile Leu Glu Gln Gln Ala Asp Asp Gln Gly 450 455 460	1392
aac aaa caa gcc ttt agt gaa att ggc ttg gtt agc ggc aga ggg act Asn Lys Gln Ala Phe Ser Glu Ile Gly Leu Val Ser Gly Arg Gly Thr 465 470 475 480	1440
gtt caa tta aac gat gat aaa caa ttt gat acc gat aaa ttt tat ttc Val Gln Leu Asn Asp Asp Lys Gln Phe Asp Thr Asp Lys Phe Tyr Phe 485 490 495	1488
ggc ttt cgt ggt ggt cgc tta gat ctt aac gga cat tca tta acc ttt Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu Thr Phe 500 505 510	1536
aaa cgt atc caa aat acg gac gag ggg gcg atg att gtg aac cat aat Lys Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn His Asn 515 520 525	1584
aca act caa gtc gct aat att act att act ggg aac gaa agt att act Thr Thr Gln Val Ala Asn Ile Thr Ile Thr Gly Asn Glu Ser Ile Thr 530 535 540	1632
gct cca tct aat aaa aat aat att aat aaa ctt gat tac agc aaa gaa Ala Pro Ser Asn Lys Asn Asn Ile Asn Lys Leu Asp Tyr Ser Lys Glu 545 550 555 560	1680
att gcc tac aac ggc tgg ttt ngc gaa aca gat aaa aat aaa cat aat Ile Ala Tyr Asn Gly Trp Phe Xaa Glu Thr Asp Lys Asn Lys His Asn 565 570 575	1728
gga cga tta aac ctt att tat aaa cca acc aca gaa gat cgt act ttg Gly Arg Leu Asn Leu Ile Tyr Lys Pro Thr Thr Glu Asp Arg Thr Leu 580 585 590	1776

cta ctt tca ggc ggc aca aac tta aaa ggc gat att act caa aca aaa Leu Leu Ser Gly Gly Thr Asn Leu Lys Gly Asp Ile Thr Gln Thr Lys 595 600 605	1824
ggc aaa cta ttt ttc agc ggc aga ccg aca ccc cac gcc tac aat cat Gly Lys Leu Phe Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His 610 615 620	1872
tta gac aaa cgt tgg tca gaa atg gaa ggc atc cca caa ggc gaa att Leu Asp Lys Arg Trp Ser Glu Met Glu Gly Ile Pro Gln Gly Glu Ile 625 630 635 640	1920
gtg tgg gat tac gat tgg att aac cgc aca ttt aaa gct gaa aac ttc Val Trp Asp Tyr Asp Trp Ile Asn Arg Thr Phe Lys Ala Glu Asn Phe 645 650 655	1968
caa att aaa ggc gga agt gcg gtg gtt tct cgc aat gtt tct tca att Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val Ser Ser Ile 660 665 670	2016
gag gga aat tgg aca gtc agc aat aat gca aat gcc aca ttt ggt gtt Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr Phe Gly Val 675 680 685	2064
gtg cca aat cag caa aat acc att tgc acg cgt tca gat tgg aca gga Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp Trp Thr Gly 690 695 700	2112
tta acg act tgt aaa aca gtt aat tta acc gat aaa aaa gtt att gat Leu Thr Thr Cys Lys Thr Val Asn Leu Thr Asp Lys Lys Val Ile Asp 705 710 715 720	2160
tcc ata ccg aca aca caa att aat ggt tct att aat tta act gat aat Ser Ile Pro Thr Thr Gln Ile Asn Gly Ser Ile Asn Leu Thr Asp Asn 725 730 735	2208
gca aca gtg aat att aat ggt tta gca aaa ctt aat ggt aat gtc act Ala Thr Val Asn Ile Asn Gly Leu Ala Lys Leu Asn Gly Asn Val Thr 740 745 750	2256
tta ata aat cat agc caa ttt aca ttg agc aac aat gcc acc caa ata Leu Ile Asn His Ser Gln Phe Thr Leu Ser Asn Asn Ala Thr Gln Ile 755 760 765	2304
ggc aat atc aaa ctt tca aat cac gca aat gca agg gta aat aat gcc Gly Asn Ile Lys Leu Ser Asn His Ala Asn Ala Arg Val Asn Asn Ala 770 775 780	2352
act tta atg ggc gat gtg aat tta gcg gat act agc cgt ttt aca tta Thr Leu Met Gly Asp Val Asn Leu Ala Asp Thr Ser Arg Phe Thr Leu 785 790 795 800	2400
agc aat caa gca aca cag att ggc aca atc agt ctt cat cag caa gct Ser Asn Gln Ala Thr Gln Ile Gly Thr Ile Ser Leu His Gln Gln Ala 805 810 815	2448
caa gca aca gtg gat aat gca aac ttg aac ggt aat gtg cat tta acg	2496

Gln	Ala	Thr	Val	Asp	Asn	Ala	Asn	Leu	Asn	Gly	Asn	Val	His	Leu	Thr		
			820					825					830				
gat	tct	gcc	aga	ttt	tct	tta	aaa	aac	agt	cat	ttt	tcg	cac	caa	att	2544	
Asp	Ser	Ala	Arg	Phe	Ser	Leu	Lys	Asn	Ser	His	Phe	Ser	His	Gln	Ile		
		835					840					845					
cag	ggc	gac	aaa	gac	aca	aca	gtg	acg	ttg	gaa	aat	gcg	act	tggt	aca	2592	
Gln	Gly	Asp	Lys	Asp	Thr	Thr	Val	Thr	Leu	Glu	Asn	Ala	Thr	Trp	Thr		
	850					855					860						
atg	cct	agc	gat	act	aca	ttg	cag	aat	tta	acg	cta	aat	aat	agt	act	2640	
Met	Pro	Ser	Asp	Thr	Thr	Leu	Gln	Asn	Leu	Thr	Leu	Asn	Asn	Ser	Thr		
865					870					875					880		
gtt	acg	tta	aat	tca	gct	tat	tca	gct	agc	tca	aat	aat	gcg	cca	cgt	2688	
Val	Thr	Leu	Asn	Ser	Ala	Tyr	Ser	Ala	Ser	Ser	Asn	Asn	Ala	Pro	Arg		
			885					890					895				
cgc	cgc	cgt	tca	tta	gag	acg	gaa	aca	acg	cca	aca	tcg	gca	gaa	cat	2736	
Arg	Arg	Arg	Ser	Leu	Glu	Thr	Glu	Thr	Thr	Pro	Thr	Ser	Ala	Glu	His		
			900					905					910				
cgt	ttc	aac	aca	ttg	aca	gta	aat	ggg	aaa	ttg	agc	ggg	caa	ggc	aca	2784	
Arg	Phe	Asn	Thr	Leu	Thr	Val	Asn	Gly	Lys	Leu	Ser	Gly	Gln	Gly	Thr		
		915					920					925					
ttc	caa	ttt	act	cca	tct	tta	ttt	ggc	tat	gaa	agc	gat	aaa	tta	aaa	2832	
Phe	Gln	Phe	Thr	Pro	Ser	Leu	Phe	Gly	Tyr	Glu	Ser	Asp	Lys	Leu	Lys		
	930					935					940						
tta	tcc	aat	gac	gct	gag	ggc	gat	tac	aca	tta	tct	gtt	cgc	aac	aca	2880	
Leu	Ser	Asn	Asp	Ala	Glu	Gly	Asp	Tyr	Thr	Leu	Ser	Val	Arg	Asn	Thr		
945					950					955					960		
ggc	aaa	gaa	ccc	gtg	acc	ctt	gag	caa	tta	act	ttg	gtt	gaa	agc	aaa	2928	
Gly	Lys	Glu	Pro	Val	Thr	Leu	Glu	Gln	Leu	Thr	Leu	Val	Glu	Ser	Lys		
			965					970						975			
gat	aat	aaa	ccg	tta	tca	gac	aaa	ctc	aaa	ttt	act	tta	gaa	aat	gac	2976	
Asp	Asn	Lys	Pro	Leu	Ser	Asp	Lys	Leu	Lys	Phe	Thr	Leu	Glu	Asn	Asp		
		980						985					990				
cac	gtt	gat	gca	ggg	gca	tta	cgt	tat	aaa	tta	gtg	aag	aat	aag	ggc	3024	
His	Val	Asp	Ala	Gly	Ala	Leu	Arg	Tyr	Lys	Leu	Val	Lys	Asn	Lys	Gly		
		995					1000					1005					
gaa	ttc	cgc	ttg	cat	aac	cca	ata	aaa	gag	cag	gaa	ttg	cgc	tct		3069	
Glu	Phe	Arg	Leu	His	Asn	Pro	Ile	Lys	Glu	Gln	Glu	Leu	Arg	Ser			
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Asp	Leu	Val	Arg	Ala	Glu	Gln	Ala	Glu	Arg	Thr	Leu	Glu	Ala	Lys			
	1025					1030					1035						
caa	gtt	gaa	cag	act	gct	gaa	aca	caa	aca	agt	aat	gca	aga	gtg		3159	
Gln	Val	Glu	Gln	Thr	Ala	Glu	Thr	Gln	Thr	Ser	Asn	Ala	Arg	Val			

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cgg tca aga aga gcg gtg ttg tct gat acc ccg tct gct caa agc			3204
Arg Ser Arg Arg Ala Val Leu Ser Asp Thr Pro Ser Ala Gln Ser			
1055	1060	1065	
ctg tta aac gca tta gaa gtc aaa caa gct gaa ccg aat gct aaa			3249
Leu Leu Asn Ala Leu Glu Val Lys Gln Ala Glu Pro Asn Ala Lys			
1070	1075	1080	
aca caa aaa agt aag gca aaa aca aaa aaa gcg ccg tca aaa aga			3294
Thr Gln Lys Ser Lys Ala Lys Thr Lys Lys Ala Arg Ser Lys Arg			
1085	1090	1095	
gca ttg aga gaa gcg ttt tct gat acc ccg cct gat cta agc cag			3339
Ala Leu Arg Glu Ala Phe Ser Asp Thr Pro Pro Asp Leu Ser Gln			
1100	1105	1110	
tta aac gta tta gaa gcc gca ctt aag gtt att aat gcc caa ccg			3384
Leu Asn Val Leu Glu Ala Ala Leu Lys Val Ile Asn Ala Gln Pro			
1115	1120	1125	
caa aca gaa aaa gaa cgt caa gct caa gag gaa gaa gcg aaa aga			3429
Gln Thr Glu Lys Glu Arg Gln Ala Gln Glu Glu Glu Ala Lys Arg			
1130	1135	1140	
caa cgc aaa caa aaa gac ttg atc agc cgt tac tca aat agt gcg			3474
Gln Arg Lys Gln Lys Asp Leu Ile Ser Arg Tyr Ser Asn Ser Ala			
1145	1150	1155	
tta tcg gag ttg tct gca aca gta aat agt atg ctt tcc gtt caa			3519
Leu Ser Glu Leu Ser Ala Thr Val Asn Ser Met Leu Ser Val Gln			
1160	1165	1170	
gat gaa ttg gat cgt ctt ttt gta gat caa gca caa tct gcc ctg			3564
Asp Glu Leu Asp Arg Leu Phe Val Asp Gln Ala Gln Ser Ala Leu			
1175	1180	1185	
tgg aca aat atc gca cag gat aaa aga cgc tat gat tct gat gcg			3609
Trp Thr Asn Ile Ala Gln Asp Lys Arg Arg Tyr Asp Ser Asp Ala			
1190	1195	1200	
ttc cgt gct tat cag cag aaa acg aac ttg cgt caa att ggg gtg			3654
Phe Arg Ala Tyr Gln Gln Lys Thr Asn Leu Arg Gln Ile Gly Val			
1205	1210	1215	
caa aaa gcc tta gat aat gga cga att ggg gcg gtt ttc tcg cat			3699
Gln Lys Ala Leu Asp Asn Gly Arg Ile Gly Ala Val Phe Ser His			
1220	1225	1230	
agc cgt tca gat aat acc ttt gac gaa cag gtt aaa aat cac gcg			3744
Ser Arg Ser Asp Asn Thr Phe Asp Glu Gln Val Lys Asn His Ala			
1235	1240	1245	
aca tta acg atg atg tcg ggt ttt gcc caa tat caa tgg ggc gat			3789
Thr Leu Thr Met Met Ser Gly Phe Ala Gln Tyr Gln Trp Gly Asp			
1250	1255	1260	

tta caa ttt ggt gta aac gtg ggc gcg gga att agt gcg agt aaa	3834
Leu Gln Phe Gly Val Asn Val Gly Ala Gly Ile Ser Ala Ser Lys	
1265 1270 1275	
atg gct gaa gaa caa agc cga aaa att cat cga aaa gcg ata aat	3879
Met Ala Glu Glu Gln Ser Arg Lys Ile His Arg Lys Ala Ile Asn	
1280 1285 1290	
tat ggt gtg aat gca agt tat cag ttc cgt tta ggg caa ttg ggt	3924
Tyr Gly Val Asn Ala Ser Tyr Gln Phe Arg Leu Gly Gln Leu Gly	
1295 1300 1305	
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Ile Gln Pro Tyr Leu Gly Val Asn Arg Tyr Phe Ile Glu Arg Glu	
1310 1315 1320	
aat tat caa tct gaa gaa gtg aaa gtg caa aca ccg agc ctt gca	4014
Asn Tyr Gln Ser Glu Glu Val Lys Val Gln Thr Pro Ser Leu Ala	
1325 1330 1335	
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Phe Asn Arg Tyr Asn Ala Gly Ile Arg Val Asp Tyr Thr Phe Thr	
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ccg aca gat aat atc agc gtt aag cct tat ttc ttt gtc aat tat	4104
Pro Thr Asp Asn Ile Ser Val Lys Pro Tyr Phe Phe Val Asn Tyr	
1355 1360 1365	
gtt gat gtt tca aac gct aac gta caa acc act gta aat agc acg	4149
Val Asp Val Ser Asn Ala Asn Val Gln Thr Thr Val Asn Ser Thr	
1370 1375 1380	
atg ttg caa caa tca ttt ggg cgt tat tgg caa aaa gaa gtg gga	4194
Met Leu Gln Gln Ser Phe Gly Arg Tyr Trp Gln Lys Glu Val Gly	
1385 1390 1395	
tta aag gca gaa att tta cat ttc caa ctt tcc gct ttt atc tca	4239
Leu Lys Ala Glu Ile Leu His Phe Gln Leu Ser Ala Phe Ile Ser	
1400 1405 1410	
aaa tct caa ggt tca caa ctc ggt aaa cag caa aat gtg ggc gtg	4284
Lys Ser Gln Gly Ser Gln Leu Gly Lys Gln Gln Asn Val Gly Val	
1415 1420 1425	
aaa ttg ggc tat cgt tgg taa	4305
Lys Leu Gly Tyr Arg Trp	
1430	

<210> 9
 <211> 1434
 <212> PRT
 <213> Haemophilus influenzae

<220>
 <221> misc_feature

<222> (568)..(568)
 <223> The 'Xaa' at location 568 stands for Ser, Gly, Arg, or Cys.

<220>
 <221> misc_feature
 <222> (1702)..(1702)
 <223> "n" at position 1702 can be any base.

<400> 9

Met Lys Lys Thr Val Phe Arg Leu Asn Phe Leu Thr Ala Cys Ile Ser
 1 5 10 15

Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile
 20 25 30

Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Glu Gly Lys Phe Ala
 35 40 45

Val Gly Ala Lys Asn Ile Asp Val Tyr Asn Lys Glu Gly Gln Leu Val
 50 55 60

Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val Ser
 65 70 75 80

Arg Asn Gly Val Ala Ala Leu Val Gly Asp Gln Tyr Ile Val Ser Val
 85 90 95

Ala His Asn Val Gly Tyr Thr Asn Val Asp Phe Gly Ala Glu Gly Gln
 100 105 110

Asn Pro Asp Gln His Arg Phe Thr Tyr Lys Ile Val Lys Arg Asn Asn
 115 120 125

Tyr Asn His Asp Ala Lys His Arg Tyr Leu Asp Asp Tyr His Asn Pro
 130 135 140

Arg Leu His Lys Phe Val Thr Asp Ala Ala Pro Ile Asp Met Thr Ser
 145 150 155 160

His Met Asp Gly Asn Lys Tyr Ala Asn Lys Glu Lys Tyr Pro Glu Arg
 165 170 175

Val Arg Val Gly Ser Gly Asp Gln Tyr Trp Asp Asp Asp Gln Asn Asn
 180 185 190

Arg Thr Tyr Leu Ser Asp Gly Tyr Asn Tyr Leu Thr Gly Gly Asn Thr
 195 200 205

Tyr Asn Gln Ser Gly Arg Gly Asp Gly Tyr Ser Tyr Val Arg Gly Asp
 210 215 220

Ile Arg Lys Val Gly Asp Tyr Gly Pro Leu Pro Ile Ala Ser Ser Phe
 225 230 235 240

Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Ala Glu Thr Gln Lys
 245 250 255

Trp Leu Ile Asn Gly Val Leu Arg Glu Gly Gln Pro Tyr Thr Gly Glu
 260 265 270

Phe Asp Gly Phe Gln Leu Ala Arg Lys Ser Phe Leu Asp Glu Ile Ile
 275 280 285

Arg Lys Asp Gln Pro Asn Gly Phe Leu Thr Pro Lys Gly Asn Gly Val
 290 295 300

Tyr Thr Ile Ser Lys Ser Asp Asp Gly Ile Gly Val Val Thr Ser Lys
 305 310 315 320

Ile Gly Lys Pro Arg Glu Ile Pro Leu Ala Asn Asn Lys Leu Lys Ile
 325 330 335

Glu Asp Lys Asp Thr Val Tyr Asn Asn Arg Tyr Asn Gly Pro Asn Ile
 340 345 350

Tyr Ser Pro Gln Leu Asn Asn Gly Lys Asn Ile Tyr Phe Gly Asp Glu
 355 360 365

Glu Leu Gly Ser Ile Thr Leu Thr Thr Asp Ile Asp Gln Gly Ala Gly
 370 375 380

Gly Leu Tyr Phe Glu Gly Asp Phe Ile Val Ser Pro Thr Lys Asn Glu
 385 390 395 400

Thr Trp Lys Gly Ala Gly Ile His Val Ser Glu Ile Ser Thr Val Thr
 405 410 415

Trp Lys Val Asn Gly Val Glu Asn Asp Arg Leu Ser Lys Ile Gly Lys
420 425 430

Gly Thr Leu His Val Lys Ala Lys Gly Glu Asn Lys Gly Ser Ile Ser
435 440 445

Val Gly Asp Gly Lys Val Ile Leu Glu Gln Gln Ala Asp Asp Gln Gly
450 455 460

Asn Lys Gln Ala Phe Ser Glu Ile Gly Leu Val Ser Gly Arg Gly Thr
465 470 475 480

Val Gln Leu Asn Asp Asp Lys Gln Phe Asp Thr Asp Lys Phe Tyr Phe
485 490 495

Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu Thr Phe
500 505 510

Lys Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn His Asn
515 520 525

Thr Thr Gln Val Ala Asn Ile Thr Ile Thr Gly Asn Glu Ser Ile Thr
530 535 540

Ala Pro Ser Asn Lys Asn Asn Ile Asn Lys Leu Asp Tyr Ser Lys Glu
545 550 555 560

Ile Ala Tyr Asn Gly Trp Phe Xaa Glu Thr Asp Lys Asn Lys His Asn
565 570 575

Gly Arg Leu Asn Leu Ile Tyr Lys Pro Thr Thr Glu Asp Arg Thr Leu
580 585 590

Leu Leu Ser Gly Gly Thr Asn Leu Lys Gly Asp Ile Thr Gln Thr Lys
595 600 605

Gly Lys Leu Phe Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His
610 615 620

Leu Asp Lys Arg Trp Ser Glu Met Glu Gly Ile Pro Gln Gly Glu Ile
625 630 635 640

Val Trp Asp Tyr Asp Trp Ile Asn Arg Thr Phe Lys Ala Glu Asn Phe

645

650

655

Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val Ser Ser Ile
660 665 670

Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr Phe Gly Val
675 680 685

Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp Trp Thr Gly
690 695 700

Leu Thr Thr Cys Lys Thr Val Asn Leu Thr Asp Lys Lys Val Ile Asp
705 710 715 720

Ser Ile Pro Thr Thr Gln Ile Asn Gly Ser Ile Asn Leu Thr Asp Asn
725 730 735

Ala Thr Val Asn Ile Asn Gly Leu Ala Lys Leu Asn Gly Asn Val Thr
740 745 750

Leu Ile Asn His Ser Gln Phe Thr Leu Ser Asn Asn Ala Thr Gln Ile
755 760 765

Gly Asn Ile Lys Leu Ser Asn His Ala Asn Ala Arg Val Asn Asn Ala
770 775 780

Thr Leu Met Gly Asp Val Asn Leu Ala Asp Thr Ser Arg Phe Thr Leu
785 790 795 800

Ser Asn Gln Ala Thr Gln Ile Gly Thr Ile Ser Leu His Gln Gln Ala
805 810 815

Gln Ala Thr Val Asp Asn Ala Asn Leu Asn Gly Asn Val His Leu Thr
820 825 830

Asp Ser Ala Arg Phe Ser Leu Lys Asn Ser His Phe Ser His Gln Ile
835 840 845

Gln Gly Asp Lys Asp Thr Thr Val Thr Leu Glu Asn Ala Thr Trp Thr
850 855 860

Met Pro Ser Asp Thr Thr Leu Gln Asn Leu Thr Leu Asn Asn Ser Thr
865 870 875 880

Val Thr Leu Asn Ser Ala Tyr Ser Ala Ser Ser Asn Asn Ala Pro Arg
885 890 895

Arg Arg Arg Ser Leu Glu Thr Glu Thr Thr Pro Thr Ser Ala Glu His
900 905 910

Arg Phe Asn Thr Leu Thr Val Asn Gly Lys Leu Ser Gly Gln Gly Thr
915 920 925

Phe Gln Phe Thr Pro Ser Leu Phe Gly Tyr Glu Ser Asp Lys Leu Lys
930 935 940

Leu Ser Asn Asp Ala Glu Gly Asp Tyr Thr Leu Ser Val Arg Asn Thr
945 950 955 960

Gly Lys Glu Pro Val Thr Leu Glu Gln Leu Thr Leu Val Glu Ser Lys
965 970 975

Asp Asn Lys Pro Leu Ser Asp Lys Leu Lys Phe Thr Leu Glu Asn Asp
980 985 990

His Val Asp Ala Gly Ala Leu Arg Tyr Lys Leu Val Lys Asn Lys Gly
995 1000 1005

Glu Phe Arg Leu His Asn Pro Ile Lys Glu Gln Glu Leu Arg Ser
1010 1015 1020

Asp Leu Val Arg Ala Glu Gln Ala Glu Arg Thr Leu Glu Ala Lys
1025 1030 1035

Gln Val Glu Gln Thr Ala Glu Thr Gln Thr Ser Asn Ala Arg Val
1040 1045 1050

Arg Ser Arg Arg Ala Val Leu Ser Asp Thr Pro Ser Ala Gln Ser
1055 1060 1065

Leu Leu Asn Ala Leu Glu Val Lys Gln Ala Glu Pro Asn Ala Lys
1070 1075 1080

Thr Gln Lys Ser Lys Ala Lys Thr Lys Lys Ala Arg Ser Lys Arg
1085 1090 1095

Ala	Leu	Arg	Glu	Ala	Phe	Ser	Asp	Thr	Pro	Pro	Asp	Leu	Ser	Gln
1100						1105					1110			
Leu	Asn	Val	Leu	Glu	Ala	Ala	Leu	Lys	Val	Ile	Asn	Ala	Gln	Pro
1115						1120					1125			
Gln	Thr	Glu	Lys	Glu	Arg	Gln	Ala	Gln	Glu	Glu	Glu	Ala	Lys	Arg
1130						1135					1140			
Gln	Arg	Lys	Gln	Lys	Asp	Leu	Ile	Ser	Arg	Tyr	Ser	Asn	Ser	Ala
1145						1150					1155			
Leu	Ser	Glu	Leu	Ser	Ala	Thr	Val	Asn	Ser	Met	Leu	Ser	Val	Gln
1160						1165					1170			
Asp	Glu	Leu	Asp	Arg	Leu	Phe	Val	Asp	Gln	Ala	Gln	Ser	Ala	Leu
1175						1180					1185			
Trp	Thr	Asn	Ile	Ala	Gln	Asp	Lys	Arg	Arg	Tyr	Asp	Ser	Asp	Ala
1190						1195					1200			
Phe	Arg	Ala	Tyr	Gln	Gln	Lys	Thr	Asn	Leu	Arg	Gln	Ile	Gly	Val
1205						1210					1215			
Gln	Lys	Ala	Leu	Asp	Asn	Gly	Arg	Ile	Gly	Ala	Val	Phe	Ser	His
1220						1225					1230			
Ser	Arg	Ser	Asp	Asn	Thr	Phe	Asp	Glu	Gln	Val	Lys	Asn	His	Ala
1235						1240					1245			
Thr	Leu	Thr	Met	Met	Ser	Gly	Phe	Ala	Gln	Tyr	Gln	Trp	Gly	Asp
1250						1255					1260			
Leu	Gln	Phe	Gly	Val	Asn	Val	Gly	Ala	Gly	Ile	Ser	Ala	Ser	Lys
1265						1270					1275			
Met	Ala	Glu	Glu	Gln	Ser	Arg	Lys	Ile	His	Arg	Lys	Ala	Ile	Asn
1280						1285					1290			
Tyr	Gly	Val	Asn	Ala	Ser	Tyr	Gln	Phe	Arg	Leu	Gly	Gln	Leu	Gly
1295						1300					1305			

Ile Gln Pro Tyr Leu Gly Val Asn Arg Tyr Phe Ile Glu Arg Glu
 1310 1315 1320

Asn Tyr Gln Ser Glu Glu Val Lys Val Gln Thr Pro Ser Leu Ala
 1325 1330 1335

Phe Asn Arg Tyr Asn Ala Gly Ile Arg Val Asp Tyr Thr Phe Thr
 1340 1345 1350

Pro Thr Asp Asn Ile Ser Val Lys Pro Tyr Phe Phe Val Asn Tyr
 1355 1360 1365

Val Asp Val Ser Asn Ala Asn Val Gln Thr Thr Val Asn Ser Thr
 1370 1375 1380

Met Leu Gln Gln Ser Phe Gly Arg Tyr Trp Gln Lys Glu Val Gly
 1385 1390 1395

Leu Lys Ala Glu Ile Leu His Phe Gln Leu Ser Ala Phe Ile Ser
 1400 1405 1410

Lys Ser Gln Gly Ser Gln Leu Gly Lys Gln Gln Asn Val Gly Val
 1415 1420 1425

Lys Leu Gly Tyr Arg Trp
 1430

<210> 10
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 <212> DNA
 <213> Haemophilus influenzae

<220>
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<400> 10
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 ccacaccgct cgcttcctta aaccgatttt agaaaaacct tagaaaaaat gaccgcactt 120
 tcagagaaaa ctcacataaa gtgcgggttat tttattagtg atattgtttt aatttttagtt 180
 atctgtataa attacataca atattaatcc atcgcaagat tagattaccc actaagtatt 240
 aagcaaaaaac ctagaaattt tggcttaatt actatatagt ttactcatt tattttcttt 300

tgtgcctttt agttcatttt ttttagctgaa atcccttaga aaatcacccgc actttttattg	360
ttcaatagtc gtttaaccac gtattttttta atacgaaaaa ttactttaatt aaataaacat	420
t atg aaa aaa act gta ttt cgt ctg aat ttt tta acc gct tgc att tca	469
Met Lys Lys Thr Val Phe Arg Leu Asn Phe Leu Thr Ala Cys Ile Ser	
1 5 10 15	
tta ggg ata gta tgc caa gcg tgg gca ggt cat act tat ttt ggg att	517
Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile	
20 25 30	
gac tac caa tat tat cgt gat ttt gcc gag aat aaa ggg aag ttt aca	565
Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Thr	
35 40 45	
gtt ggg gct caa gat att gat atc tac aat aaa aaa ggg gaa atg ata	613
Val Gly Ala Gln Asp Ile Asp Ile Tyr Asn Lys Lys Gly Glu Met Ile	
50 55 60	
ggg acg atg atg aaa ggt gtg cct atg cct gat tta tct tcc atg gtt	661
Gly Thr Met Met Lys Gly Val Pro Met Pro Asp Leu Ser Ser Met Val	
65 70 75 80	
cgt ggt ggt tat tca aca ttg ata agt gag cag cat tta att agc gtc	709
Arg Gly Gly Tyr Ser Thr Leu Ile Ser Glu Gln His Leu Ile Ser Val	
85 90 95	
gca cat aat gta ggg tat gat gtc gtt gat ttt ggt atg gag ggg gaa	757
Ala His Asn Val Gly Tyr Asp Val Val Asp Phe Gly Met Glu Gly Glu	
100 105 110	
aat cca gac caa cat cgt ttt aag tat aaa gtt gtt aaa cga tat aat	805
Asn Pro Asp Gln His Arg Phe Lys Tyr Lys Val Val Lys Arg Tyr Asn	
115 120 125	
tat aag agc ggt gat aga caa tat aat gat tat caa cat cca aga tta	853
Tyr Lys Ser Gly Asp Arg Gln Tyr Asn Asp Tyr Gln His Pro Arg Leu	
130 135 140	
gag aaa ttt gta acg gaa act gca cct att gaa atg gtt tca tat atg	901
Glu Lys Phe Val Thr Glu Thr Ala Pro Ile Glu Met Val Ser Tyr Met	
145 150 155 160	
gat ggt aat cat tac aaa aat ttt aat caa tat cct ttg cga gtt aga	949
Asp Gly Asn His Tyr Lys Asn Phe Asn Gln Tyr Pro Leu Arg Val Arg	
165 170 175	
gtt gga agt ggg cat caa tgg tgg aaa gac gat aat aat aaa acc att	997
Val Gly Ser Gly His Gln Trp Trp Lys Asp Asp Asn Asn Lys Thr Ile	
180 185 190	
gga gac tta gcc tat gga ggt tca tgg tta ata ggt gga aat acc ttt	1045
Gly Asp Leu Ala Tyr Gly Gly Ser Trp Leu Ile Gly Gly Asn Thr Phe	
195 200 205	

gaa gat gga cca gct ggt aac ggt aca tta gaa tta aat ggg cga gta Glu Asp Gly Pro Ala Gly Asn Gly Thr Leu Glu Leu Asn Gly Arg Val 210 215 220	1093
caa aat cct aat aaa tat ggt cca cta cct acg gca ggt tca ttc ggg Gln Asn Pro Asn Lys Tyr Gly Pro Leu Pro Thr Ala Gly Ser Phe Gly 225 230 235 240	1141
gat agt ggt tct cca atg ttt att tat gat aag gaa gtt aag aaa tgg Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Lys Glu Val Lys Lys Trp 245 250 255	1189
tta tta aat ggc gtg tta cgt gaa gga aat cct tat gct gca gta gga Leu Leu Asn Gly Val Leu Arg Glu Gly Asn Pro Tyr Ala Ala Val Gly 260 265 270	1237
aac agc tat caa att aca cga aaa gat tat ttt caa ggt att ctt aat Asn Ser Tyr Gln Ile Thr Arg Lys Asp Tyr Phe Gln Gly Ile Leu Asn 275 280 285	1285
caa gac att aca gct aat ttt tgg gat act aat gct gaa tat aga ttt Gln Asp Ile Thr Ala Asn Phe Trp Asp Thr Asn Ala Glu Tyr Arg Phe 290 295 300	1333
aat ata ggg agt gac cac aat gga aga gtg gca aca atc aaa agt aca Asn Ile Gly Ser Asp His Asn Gly Arg Val Ala Thr Ile Lys Ser Thr 305 310 315 320	1381
tta cct aaa aaa gct att cag cct gaa cga ata gtg ggt ctt tat gat Leu Pro Lys Lys Ala Ile Gln Pro Glu Arg Ile Val Gly Leu Tyr Asp 325 330 335	1429
aat agc caa ctt cat gat gct aga gat aaa aat ggc gat gaa tct ccc Asn Ser Gln Leu His Asp Ala Arg Asp Lys Asn Gly Asp Glu Ser Pro 340 345 350	1477
tct tat aaa ggt cct aat cca tgg teg cca gca tta cat cat ggg aaa Ser Tyr Lys Gly Pro Asn Pro Trp Ser Pro Ala Leu His His Gly Lys 355 360 365	1525
agt att tac ttt ggc gat caa gga aca gga act tta aca att gaa aat Ser Ile Tyr Phe Gly Asp Gln Gly Thr Gly Thr Leu Thr Ile Glu Asn 370 375 380	1573
aat ata aat caa ggt gca ggt gga ttg tat ttt gaa ggt aat ttt gtt Asn Ile Asn Gln Gly Ala Gly Gly Leu Tyr Phe Glu Gly Asn Phe Val 385 390 395 400	1621
gta aaa ggc aat caa aat aat ata act tgg caa ggt gca ggc gtt tct Val Lys Gly Asn Gln Asn Asn Ile Thr Trp Gln Gly Ala Gly Val Ser 405 410 415	1669
gtt gga gaa gaa agt act gtt gaa tgg cag gtg cat aat cca gaa ggc Val Gly Glu Glu Ser Thr Val Glu Trp Gln Val His Asn Pro Glu Gly 420 425 430	1717
gat cgc tta tcc aaa att ggg ctg gga acc tta ctt gtt aat ggt aaa	1765

Asp Arg Leu Ser Lys Ile Gly Leu Gly Thr Leu Leu Val Asn Gly Lys	
435 440 445	
ggg aaa aac tta gga agc ctg agt gtc ggt aac ggt ttg gtt gtg tta	1813
Gly Lys Asn Leu Gly Ser Leu Ser Val Gly Asn Gly Leu Val Val Leu	
450 455 460	
gat caa caa gca gat gaa tca ggt caa aaa caa gcc ttt aaa gaa gtt	1861
Asp Gln Gln Ala Asp Glu Ser Gly Gln Lys Gln Ala Phe Lys Glu Val	
465 470 475 480	
ggc att gta agt ggt aga gct acc gtt caa cta aat agt gca gat caa	1909
Gly Ile Val Ser Gly Arg Ala Thr Val Gln Leu Asn Ser Ala Asp Gln	
485 490 495	
gtt gat cct aac aat att tat ttc ggc ttt cgt ggt ggt cgc tta gat	1957
Val Asp Pro Asn Asn Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp	
500 505 510	
ctt aat ggg cat tca tta acc ttt gaa cgt atc caa aat acg gat gaa	2005
Leu Asn Gly His Ser Leu Thr Phe Glu Arg Ile Gln Asn Thr Asp Glu	
515 520 525	
ggc gcg atg att gtg aac cac aac gct tct caa acc gca aat att acg	2053
Gly Ala Met Ile Val Asn His Asn Ala Ser Gln Thr Ala Asn Ile Thr	
530 535 540	
att aca ggc aac gca act att aat tca gat agc aaa caa ctt act aat	2101
Ile Thr Gly Asn Ala Thr Ile Asn Ser Asp Ser Lys Gln Leu Thr Asn	
545 550 555 560	
aaa aaa gat att gca ttt aac ggc tgg ttt ggt gag caa gat aaa gct	2149
Lys Lys Asp Ile Ala Phe Asn Gly Trp Phe Gly Glu Gln Asp Lys Ala	
565 570 575	
aaa aca aat ggt cgt tta aat gtg aat tat caa cca gtt aat gca gaa	2197
Lys Thr Asn Gly Arg Leu Asn Val Asn Tyr Gln Pro Val Asn Ala Glu	
580 585 590	
aat cat ttg ttg ctt tct ggg ggg aca aat tta aac ggc aat atc acg	2245
Asn His Leu Leu Leu Ser Gly Gly Thr Asn Leu Asn Gly Asn Ile Thr	
595 600 605	
caa aat ggt ggt acg tta gtt ttt agt ggt cgt cca acg cct cat gct	2293
Gln Asn Gly Gly Thr Leu Val Phe Ser Gly Arg Pro Thr Pro His Ala	
610 615 620	
tac aat cat tta aga aga gac ttg tct aac atg gaa ggt atc cca caa	2341
Tyr Asn His Leu Arg Arg Asp Leu Ser Asn Met Glu Gly Ile Pro Gln	
625 630 635 640	
ggc gaa att gtg tgg gat cac gat tgg atc aac cgc aca ttt aaa gct	2389
Gly Glu Ile Val Trp Asp His Asp Trp Ile Asn Arg Thr Phe Lys Ala	
645 650 655	
gaa aac ttc caa att aaa ggc gga agt gcg gtg gtt tct cgc aat gtt	2437
Glu Asn Phe Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val	

660										665					670					
tct	tca	att	gag	gga	aat	tgg	aca	gtc	agc	aat	aat	gca	aat	gcc	aca	2485				
Ser	Ser	Ile	Glu	Gly	Asn	Trp	Thr	Val	Ser	Asn	Asn	Ala	Asn	Ala	Thr					
675					680					685										
ttt	ggg	gtt	gtg	cca	aat	cag	caa	aat	acc	att	tgc	acg	cgt	tca	gat	2533				
Phe	Gly	Val	Val	Pro	Asn	Gln	Gln	Asn	Thr	Ile	Cys	Thr	Arg	Ser	Asp					
690					695					700										
tgg	aca	gga	tta	acg	act	tgt	aaa	aca	gtt	gat	tta	acc	gat	aaa	aaa	2581				
Trp	Thr	Gly	Leu	Thr	Thr	Cys	Lys	Thr	Val	Asp	Leu	Thr	Asp	Lys	Lys					
705					710					715					720					
gtt	att	aat	tcc	ata	ccg	aca	aca	caa	att	aat	ggg	tct	att	aat	tta	2629				
Val	Ile	Asn	Ser	Ile	Pro	Thr	Thr	Gln	Ile	Asn	Gly	Ser	Ile	Asn	Leu					
725					730					735										
act	gat	aat	gca	aca	gtg	aat	att	cat	ggg	tta	gca	aaa	ctt	aat	ggg	2677				
Thr	Asp	Asn	Ala	Thr	Val	Asn	Ile	His	Gly	Leu	Ala	Lys	Leu	Asn	Gly					
740					745					750										
aat	gtc	act	tta	ata	gat	cac	agc	caa	ttt	aca	ttg	agc	aac	aat	gcc	2725				
Asn	Val	Thr	Leu	Ile	Asp	His	Ser	Gln	Phe	Thr	Leu	Ser	Asn	Asn	Ala					
755					760					765										
acc	caa	aca	ggc	aat	atc	aaa	ctt	tca	aat	cac	gca	aat	gca	acg	gtg	2773				
Thr	Gln	Thr	Gly	Asn	Ile	Lys	Leu	Ser	Asn	His	Ala	Asn	Ala	Thr	Val					
770					775					780										
gac	aat	gca	aat	ttg	aac	ggg	aat	gtg	aat	tta	atg	gat	tct	gct	caa	2821				
Asp	Asn	Ala	Asn	Leu	Asn	Gly	Asn	Val	Asn	Leu	Met	Asp	Ser	Ala	Gln					
785					790					795					800					
ttt	tct	tta	aaa	aac	agc	cat	ttt	tcg	cac	caa	atc	caa	ggg	ggg	gaa	2869				
Phe	Ser	Leu	Lys	Asn	Ser	His	Phe	Ser	His	Gln	Ile	Gln	Gly	Gly	Glu					
805					810					815										
gac	aca	aca	gtg	atg	ttg	gaa	aat	gcg	act	tgg	aca	atg	cct	agc	gat	2917				
Asp	Thr	Thr	Val	Met	Leu	Glu	Asn	Ala	Thr	Trp	Thr	Met	Pro	Ser	Asp					
820					825					830										
acc	aca	ttg	cag	aat	tta	acg	cta	aat	aat	agt	act	gtt	acg	tta	aat	2965				
Thr	Thr	Leu	Gln	Asn	Leu	Thr	Leu	Asn	Asn	Ser	Thr	Val	Thr	Leu	Asn					
835					840					845										
tca	gct	tat	tca	gct	atc	tca	aat	aat	gcg	cca	cgc	cgt	cgc	cgc	cgt	3013				
Ser	Ala	Tyr	Ser	Ala	Ile	Ser	Asn	Asn	Ala	Pro	Arg	Arg	Arg	Arg	Arg					
850					855					860										
tca	tta	gag	acg	gaa	aca	acg	cca	aca	tcg	gca	gaa	cat	cgt	ttc	aac	3061				
Ser	Leu	Glu	Thr	Glu	Thr	Thr	Pro	Thr	Ser	Ala	Glu	His	Arg	Phe	Asn					
865					870					875					880					
aca	ttg	aca	gta	aat	ggg	aaa	ttg	agc	ggg	caa	ggc	aca	ttc	caa	ttt	3109				
Thr	Leu	Thr	Val	Asn	Gly	Lys	Leu	Ser	Gly	Gln	Gly	Thr	Phe	Gln	Phe					
885					890					895										

act tca tct tta ttt ggc tat aaa agc gat aaa tta aaa tta tcc aat	3157
Thr Ser Ser Leu Phe Gly Tyr Lys Ser Asp Lys Leu Lys Leu Ser Asn	
900 905 910	
gac gct gag ggc gat tac aca tta tct gtt cgc aac aca ggc aaa gaa	3205
Asp Ala Glu Gly Asp Tyr Thr Leu Ser Val Arg Asn Thr Gly Lys Glu	
915 920 925	
ccc gtg acc ttt ggg caa tta act ttg gtt gaa agc aaa gat aat aaa	3253
Pro Val Thr Phe Gly Gln Leu Thr Leu Val Glu Ser Lys Asp Asn Lys	
930 935 940	
ccg tta tca gac aaa ctc aca ttc acg tta gaa aat gac cac gtt gat	3301
Pro Leu Ser Asp Lys Leu Thr Phe Thr Leu Glu Asn Asp His Val Asp	
945 950 955 960	
gca ggt gca tta cgt tat aaa tta gtg aag aat gat ggc gaa ttc cgc	3349
Ala Gly Ala Leu Arg Tyr Lys Leu Val Lys Asn Asp Gly Glu Phe Arg	
965 970 975	
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Leu His Asn Pro Ile Lys Glu Gln Glu Leu Arg Ser Asp Leu Val Arg	
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gca gag caa gca gaa cga aca tta gaa gcc aaa caa gtt gaa cag act	3445
Ala Glu Gln Ala Glu Arg Thr Leu Glu Ala Lys Gln Val Glu Gln Thr	
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Ala Lys Thr Gln Thr Ser Lys Ala Arg Val Arg Ser Arg Arg Ala	
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Val Phe Ser Asp Pro Leu Pro Ala Gln Ser Leu Leu Lys Ala Leu	
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gaa gcc aaa caa gct ctg act act gaa aca caa aca agt aag gca	3580
Glu Ala Lys Gln Ala Leu Thr Thr Glu Thr Gln Thr Ser Lys Ala	
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Lys Lys Val Arg Ser Lys Arg Ala Ala Arg Glu Phe Ser Asp Thr	
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ctg cct gat caa ata tta caa gcc gca ctt gag gtt att gat gcc	3670
Leu Pro Asp Gln Ile Leu Gln Ala Ala Leu Glu Val Ile Asp Ala	
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Gln Gln Gln Val Lys Lys Glu Pro Gln Thr Gln Glu Glu Glu Glu	
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Lys Arg Gln Arg Lys Gln Lys Glu Leu Ile Ser Arg Tyr Ser Asn	
1100 1105 1110	

agt gcg tta tcg gag ttg tct	gcg aca gta aat agt	atg ctt tcc	3805
Ser Ala Leu Ser Glu Leu Ser	Ala Thr Val Asn Ser	Met Leu Ser	
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ggt caa gat gaa ttg gat cgt	ctt ttt gta gat caa	gca caa tct	3850
Val Gln Asp Glu Leu Asp Arg	Leu Phe Val Asp Gln	Ala Gln Ser	
1130	1135	1140	
gcc gtg tgg aca aat atc gca	cag gat aaa aga cgc	tat gat tct	3895
Ala Val Trp Thr Asn Ile Ala	Gln Asp Lys Arg Arg	Tyr Asp Ser	
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gat gcg ttc cgt gct tat cag	cag aaa acg aac ttg	cgt caa att	3940
Asp Ala Phe Arg Ala Tyr Gln	Gln Lys Thr Asn Leu	Arg Gln Ile	
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Gly Val Gln Lys Ala Leu Asp	Asn Gly Arg Ile Gly	Ala Val Phe	
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tcg cat agc cgt tca gat aat	acc ttt gac gaa cag	gtt aaa aat	4030
Ser His Ser Arg Ser Asp Asn	Thr Phe Asp Glu Gln	Val Lys Asn	
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His Ala Thr Leu Ala Met Met	Ser Gly Phe Ala Gln	Tyr Gln Trp	
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Gly Asp Leu Gln Phe Gly Val	Asn Val Gly Ala Gly	Ile Ser Ala	
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Ser Lys Met Ala Glu Glu Gln	Ser Arg Lys Ile His	Arg Lys Ala	
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Ile Asn Tyr Gly Val Asn Ala	Ser Tyr Gln Phe Arg	Leu Gly Gln	
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Leu Gly Ile Gln Pro Tyr Leu	Gly Val Asn Arg Tyr	Phe Ile Glu	
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cgt gaa aat tat caa tct gaa	gaa gtg aaa gtg caa	aca ccg agc	4300
Arg Glu Asn Tyr Gln Ser Glu	Glu Val Lys Val Gln	Thr Pro Ser	
1280	1285	1290	
ctt gta ttt aat cgc tat aat	gct ggc att cga gtt	gat tat aca	4345
Leu Val Phe Asn Arg Tyr Asn	Ala Gly Ile Arg Val	Asp Tyr Thr	
1295	1300	1305	
ttt acc ccg aca gat aat atc	agc att aag cct tat	ttc ttc gtc	4390
Phe Thr Pro Thr Asp Asn Ile	Ser Ile Lys Pro Tyr	Phe Phe Val	
1310	1315	1320	
aat tat gtt gat gtt tca aac	gct aac gta caa acc	act gta aat	4435

Asn	Tyr	Val	Asp	Val	Ser	Asn	Ala	Asn	Val	Gln	Thr	Thr	Val	Asn	
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Arg	Thr	Met	Leu	Gln	Gln	Ser	Phe	Gly	Arg	Tyr	Trp	Gln	Lys	Glu	
1340						1345					1350				
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Val	Gly	Leu	Lys	Ala	Glu	Ile	Leu	His	Phe	Gln	Leu	Ser	Ala	Phe	
1355						1360					1365				
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Ile	Ser	Lys	Ser	Gln	Gly	Ser	Gln	Leu	Gly	Lys	Gln	Gln	Asn	Val	
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Asp	Tyr	Gln	Tyr	Tyr	Arg	Asp	Phe	Ala	Glu	Asn	Lys	Gly	Lys	Phe	Thr
		35					40					45			
Val	Gly	Ala	Gln	Asp	Ile	Asp	Ile	Tyr	Asn	Lys	Lys	Gly	Glu	Met	Ile
	50					55					60				
Gly	Thr	Met	Met	Lys	Gly	Val	Pro	Met	Pro	Asp	Leu	Ser	Ser	Met	Val
65				70					75					80	
Arg	Gly	Gly	Tyr	Ser	Thr	Leu	Ile	Ser	Glu	Gln	His	Leu	Ile	Ser	Val
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Ala	His	Asn	Val	Gly	Tyr	Asp	Val	Val	Asp	Phe	Gly	Met	Glu	Gly	Glu
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Asn	Pro	Asp	Gln	His	Arg	Phe	Lys	Tyr	Lys	Val	Val	Lys	Arg	Tyr	Asn
		115					120					125			

Tyr Lys Ser Gly Asp Arg Gln Tyr Asn Asp Tyr Gln His Pro Arg Leu
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Glu Lys Phe Val Thr Glu Thr Ala Pro Ile Glu Met Val Ser Tyr Met
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Asp Gly Asn His Tyr Lys Asn Phe Asn Gln Tyr Pro Leu Arg Val Arg
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Val Gly Ser Gly His Gln Trp Trp Lys Asp Asp Asn Asn Lys Thr Ile
 180 185 190

Gly Asp Leu Ala Tyr Gly Gly Ser Trp Leu Ile Gly Gly Asn Thr Phe
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Glu Asp Gly Pro Ala Gly Asn Gly Thr Leu Glu Leu Asn Gly Arg Val
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Gln Asn Pro Asn Lys Tyr Gly Pro Leu Pro Thr Ala Gly Ser Phe Gly
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Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Lys Glu Val Lys Lys Trp
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Leu Leu Asn Gly Val Leu Arg Glu Gly Asn Pro Tyr Ala Ala Val Gly
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Asn Ser Tyr Gln Ile Thr Arg Lys Asp Tyr Phe Gln Gly Ile Leu Asn
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Gln Asp Ile Thr Ala Asn Phe Trp Asp Thr Asn Ala Glu Tyr Arg Phe
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Asn Ser Gln Leu His Asp Ala Arg Asp Lys Asn Gly Asp Glu Ser Pro
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Ser Tyr Lys Gly Pro Asn Pro Trp Ser Pro Ala Leu His His Gly Lys
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Ser Ile Tyr Phe Gly Asp Gln Gly Thr Gly Thr Leu Thr Ile Glu Asn
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Asn Ile Asn Gln Gly Ala Gly Gly Leu Tyr Phe Glu Gly Asn Phe Val
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Val Lys Gly Asn Gln Asn Asn Ile Thr Trp Gln Gly Ala Gly Val Ser
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Val Gly Glu Glu Ser Thr Val Glu Trp Gln Val His Asn Pro Glu Gly
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Asp Arg Leu Ser Lys Ile Gly Leu Gly Thr Leu Leu Val Asn Gly Lys
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Gly Lys Asn Leu Gly Ser Leu Ser Val Gly Asn Gly Leu Val Val Leu
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Asp Gln Gln Ala Asp Glu Ser Gly Gln Lys Gln Ala Phe Lys Glu Val
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Gly Ile Val Ser Gly Arg Ala Thr Val Gln Leu Asn Ser Ala Asp Gln
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Val Asp Pro Asn Asn Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp
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Leu Asn Gly His Ser Leu Thr Phe Glu Arg Ile Gln Asn Thr Asp Glu
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Lys Lys Asp Ile Ala Phe Asn Gly Trp Phe Gly Glu Gln Asp Lys Ala
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Lys Thr Asn Gly Arg Leu Asn Val Asn Tyr Gln Pro Val Asn Ala Glu
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Asn His Leu Leu Leu Ser Gly Gly Thr Asn Leu Asn Gly Asn Ile Thr
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Gln Asn Gly Gly Thr Leu Val Phe Ser Gly Arg Pro Thr Pro His Ala
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Tyr Asn His Leu Arg Arg Asp Leu Ser Asn Met Glu Gly Ile Pro Gln
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Gly Glu Ile Val Trp Asp His Asp Trp Ile Asn Arg Thr Phe Lys Ala
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Glu Asn Phe Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val
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Ser Ser Ile Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr
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Phe Gly Val Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp
 690 695 700

Trp Thr Gly Leu Thr Thr Cys Lys Thr Val Asp Leu Thr Asp Lys Lys
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Val Ile Asn Ser Ile Pro Thr Thr Gln Ile Asn Gly Ser Ile Asn Leu
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Thr Asp Asn Ala Thr Val Asn Ile His Gly Leu Ala Lys Leu Asn Gly
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Asn Val Thr Leu Ile Asp His Ser Gln Phe Thr Leu Ser Asn Asn Ala
 755 760 765

Thr Gln Thr Gly Asn Ile Lys Leu Ser Asn His Ala Asn Ala Thr Val
 770 775 780

Asp Asn Ala Asn Leu Asn Gly Asn Val Asn Leu Met Asp Ser Ala Gln
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Phe Ser Leu Lys Asn Ser His Phe Ser His Gln Ile Gln Gly Gly Glu

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Ser	Leu	Glu	Thr	Glu	Thr	Thr	Pro	Thr	Ser	Ala	Glu	His	Arg	Phe	Asn				
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1070						1075					1080			
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Ser	Lys	Met	Ala	Glu	Glu	Gln	Ser	Arg	Lys	Ile	His	Arg	Lys	Ala
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Phe Thr Pro Thr Asp Asn Ile Ser Ile Lys Pro Tyr Phe Phe Val
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Gly Ile Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys	
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Phe Ser Val Gly Ala Lys Asn Ile Glu Val Tyr Asn Lys Glu Gly Thr	
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Leu Val Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val	
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Gly Thr Gly Thr Val Thr Gln Thr Asn Glu Lys Val Ser Met Pro Gln	
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Phe Lys Val Arg Thr Val Gln Leu Phe Asn Glu Ala Leu Lys Glu Lys	
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Thr Leu Thr Ile Glu Asn Asn Ile Asn Gln Gly Ala Gly Gly Leu Tyr	
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aat aaa aat aat att aat aaa ctt gat tac agc aaa gaa att gct tac Asn Lys Asn Asn Ile Asn Lys Leu Asp Tyr Ser Lys Glu Ile Ala Tyr 560 565 570	2151
aac ggt tgg ttt ggc gaa aca gat gaa aat aaa cac aat gga aga tta Asn Gly Trp Phe Gly Glu Thr Asp Glu Asn Lys His Asn Gly Arg Leu 575 580 585 590	2199
aac ctt att tat aaa cca acc aca gaa gat cgt act ttg cta ctt tca Asn Leu Ile Tyr Lys Pro Thr Thr Glu Asp Arg Thr Leu Leu Leu Ser 595 600 605	2247
ggt gga aca aat tta aaa ggc aat att act cag gaa ggc ggc act tta Gly Gly Thr Asn Leu Lys Gly Asn Ile Thr Gln Glu Gly Gly Thr Leu 610 615 620	2295
gtg ttt agt ggt cgc cca act cca cac gct tac aat cat tta aat cgc Val Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His Leu Asn Arg 625 630 635	2343
cca aac gag ctt ggg cga cct caa ggc gaa gtg gtt att gat gac gat	2391

Pro	Asn	Glu	Leu	Gly	Arg	Pro	Gln	Gly	Glu	Val	Val	Ile	Asp	Asp	Asp		
640						645					650						
tgg	atc	acc	cgc	aca	ttt	aaa	gct	gaa	aac	ttc	caa	att	aaa	ggc	gga	2439	
Trp	Ile	Thr	Arg	Thr	Phe	Lys	Ala	Glu	Asn	Phe	Gln	Ile	Lys	Gly	Gly		
655					660					665					670		
agt	gcg	gtg	gtt	tct	cgc	aat	gtt	tct	tca	att	gag	gga	aat	tgg	aca	2487	
Ser	Ala	Val	Val	Ser	Arg	Asn	Val	Ser	Ser	Ile	Glu	Gly	Asn	Trp	Thr		
				675					680					685			
gtc	agc	aat	aat	gca	aat	gcc	gca	ttt	ggg	gtt	gtg	cca	aat	cag	caa	2535	
Val	Ser	Asn	Asn	Ala	Asn	Ala	Ala	Phe	Gly	Val	Val	Pro	Asn	Gln	Gln		
			690					695					700				
aat	acc	att	tgc	acg	cgt	tca	gat	tgg	aca	gga	tta	acg	act	tgt	aaa	2583	
Asn	Thr	Ile	Cys	Thr	Arg	Ser	Asp	Trp	Thr	Gly	Leu	Thr	Thr	Cys	Lys		
	705					710						715					
act	gtg	gat	tta	acc	gat	aca	aaa	gtt	att	aat	tcc	ata	ccg	aca	aca	2631	
Thr	Val	Asp	Leu	Thr	Asp	Thr	Lys	Val	Ile	Asn	Ser	Ile	Pro	Thr	Thr		
	720					725					730						
caa	att	aat	ggc	tct	att	aat	tta	act	gat	aat	gca	aca	gtg	aat	att	2679	
Gln	Ile	Asn	Gly	Ser	Ile	Asn	Leu	Thr	Asp	Asn	Ala	Thr	Val	Asn	Ile		
735					740				745						750		
cat	ggg	tta	gca	aaa	ctt	aat	ggg	aat	gtc	act	tta	ata	aat	cat	agc	2727	
His	Gly	Leu	Ala	Lys	Leu	Asn	Gly	Asn	Val	Thr	Leu	Ile	Asn	His	Ser		
				755					760					765			
caa	ttt	aca	ttg	agc	aac	aat	gcc	acc	caa	aca	ggc	aat	atc	caa	ctt	2775	
Gln	Phe	Thr	Leu	Ser	Asn	Asn	Ala	Thr	Gln	Thr	Gly	Asn	Ile	Gln	Leu		
			770					775					780				
tca	aat	cac	gca	aat	gca	acg	gtg	gac	aat	gca	aat	ttg	aac	ggg	aat	2823	
Ser	Asn	His	Ala	Asn	Ala	Thr	Val	Asp	Asn	Ala	Asn	Leu	Asn	Gly	Asn		
		785				790						795					
gtg	cat	tta	acg	gat	tct	gct	caa	ttt	tct	tta	aaa	aac	agc	cat	ttt	2871	
Val	His	Leu	Thr	Asp	Ser	Ala	Gln	Phe	Ser	Leu	Lys	Asn	Ser	His	Phe		
	800					805					810						
tcg	cac	caa	att	cag	ggc	gac	aaa	gac	aca	aca	gtg	acg	ttg	gaa	aat	2919	
Ser	His	Gln	Ile	Gln	Gly	Asp	Lys	Asp	Thr	Val	Thr	Leu	Glu	Asn			
815					820					825				830			
gcg	act	tgg	aca	atg	cct	agc	gat	gcc	aca	ttg	cag	aat	tta	acg	cta	2967	
Ala	Thr	Trp	Thr	Met	Pro	Ser	Asp	Ala	Thr	Leu	Gln	Asn	Leu	Thr	Leu		
				835					840					845			
aat	aat	agt	act	gtt	acg	tta	aat	tca	gct	tat	tca	gct	agc	tca	aat	3015	
Asn	Asn	Ser	Thr	Val	Thr	Leu	Asn	Ser	Ala	Tyr	Ser	Ala	Ser	Ser	Asn		
			850					855					860				
aat	gcg	cca	cgt	cac	cgc	cgt	tca	tta	gag	acg	gaa	aca	acg	cca	aca	3063	
Asn	Ala	Pro	Arg	His	Arg	Arg	Ser	Leu	Glu	Thr	Glu	Thr	Thr	Pro	Thr		

865	870	875	
tcg gca gaa cat cgt ttc aac aca ttg aca gta aat ggt aaa ttg agc Ser Ala Glu His Arg Phe Asn Thr Leu Thr Val Asn Gly Lys Leu Ser 880 885 890			3111
ggg caa ggc aca ttc caa ttt act tca tct tta ttt ggc tat aaa agc Gly Gln Gly Thr Phe Gln Phe Thr Ser Ser Leu Phe Gly Tyr Lys Ser 895 900 905 910			3159
gat aaa tta aaa tta tcc aat gac gct gag ggc gat tac aca tta tct Asp Lys Leu Lys Leu Ser Asn Asp Ala Glu Gly Asp Tyr Thr Leu Ser 915 920 925			3207
gtt cgc aac aca ggc aaa gaa ccc gaa gcc ctt gag caa tta act ttg Val Arg Asn Thr Gly Lys Glu Pro Glu Ala Leu Glu Gln Leu Thr Leu 930 935 940			3255
gtt gaa agc aaa gat aat aaa ccg tta tca gac aaa ctc aaa ttt act Val Glu Ser Lys Asp Asn Lys Pro Leu Ser Asp Lys Leu Lys Phe Thr 945 950 955			3303
tta gaa aat gac cac gtt gat gca ggt gca tta cgt tat aaa tta gtg Leu Glu Asn Asp His Val Asp Ala Gly Ala Leu Arg Tyr Lys Leu Val 960 965 970			3351
aag aat aat ggc gaa ttc cgc ttg cat aac cca ata aaa gag cag gaa Lys Asn Asn Gly Glu Phe Arg Leu His Asn Pro Ile Lys Glu Gln Glu 975 980 985 990			3399
ttg cgc aat gat tta gta aga gca gag caa gca gaa cga aca tta gaa Leu Arg Asn Asp Leu Val Arg Ala Glu Gln Ala Glu Arg Thr Leu Glu 995 1000 1005			3447
gcc aaa caa gtt gaa cag act gct gaa aca caa aca agt aat gca Ala Lys Gln Val Glu Gln Thr Ala Glu Thr Gln Thr Ser Asn Ala 1010 1015 1020			3492
aga gtg cgg tca aaa aga gcg gtg ttt tct gat acc ctg cct gat Arg Val Arg Ser Lys Arg Ala Val Phe Ser Asp Thr Leu Pro Asp 1025 1030 1035			3537
caa agc cag tta gac gta tta caa gcc gaa caa gtt gaa ccg act Gln Ser Gln Leu Asp Val Leu Gln Ala Glu Gln Val Glu Pro Thr 1040 1045 1050			3582
gct gaa aaa caa aaa aat aag gca aaa aaa gtg cgg tca aaa aga Ala Glu Lys Gln Lys Asn Lys Ala Lys Lys Val Arg Ser Lys Arg 1055 1060 1065			3627
gcg gtg ttt tct gat acc ctg cct gat caa agc cag tta gac gta Ala Val Phe Ser Asp Thr Leu Pro Asp Gln Ser Gln Leu Asp Val 1070 1075 1080			3672
tta caa gcc gaa caa gtt gaa ccg act gct gaa aaa caa aaa aat Leu Gln Ala Glu Gln Val Glu Pro Thr Ala Glu Lys Gln Lys Asn 1085 1090 1095			3717

aag gca aaa aaa	gtg cgg tca aaa	aga gcc gcg aga gag	ttt tct	3762
Lys Ala Lys Lys	Val Arg Ser Lys	Arg Ala Ala Arg Glu Phe	Ser	
1100	1105	1110		
gat acc ccg ctt	gat cta agc cgg	tta aag gta tta gaa gtc	aaa	3807
Asp Thr Pro Leu	Asp Leu Ser Arg	Leu Lys Val Leu Glu Val	Lys	
1115	1120	1125		
ctt gag gtt att	aat gcc caa cag	caa gtg aaa aaa gaa cct	caa	3852
Leu Glu Val Ile	Asn Ala Gln Gln	Gln Val Lys Lys Glu Pro	Gln	
1130	1135	1140		
gat caa gag aaa	caa cgc aaa caa	aaa gac ttg atc agc cgt	tat	3897
Asp Gln Glu Lys	Gln Arg Lys Gln	Lys Asp Leu Ile Ser Arg	Tyr	
1145	1150	1155		
tca aat agt gcg	tta tca gaa tta	tct gca aca gta aat	agt atg	3942
Ser Asn Ser Ala	Leu Ser Glu Leu	Ser Ala Thr Val Asn Ser	Met	
1160	1165	1170		
ctt tct gtt caa	gat gaa tta gat	cgt ctt ttt gta gat	caa gca	3987
Leu Ser Val Gln	Asp Glu Leu Asp	Arg Leu Phe Val Asp	Gln Ala	
1175	1180	1185		
caa tct gcc gtg	tgg aca aat atc	gca cag gat aaa aga	cgc tat	4032
Gln Ser Ala Val	Trp Thr Asn Ile	Ala Gln Asp Lys Arg Arg	Tyr	
1190	1195	1200		
gat tct gat gcg	ttc cgt gct tat	cag cag aaa acg aac	tta cgt	4077
Asp Ser Asp Ala	Phe Arg Ala Tyr	Gln Gln Lys Thr Asn Leu	Arg	
1205	1210	1215		
caa att ggg gtg	caa aaa gcc tta	gct aat gga cga att	ggg gca	4122
Gln Ile Gly Val	Gln Lys Ala Leu	Ala Asn Gly Arg Ile Gly	Ala	
1220	1225	1230		
gtt ttc tcg cat	agc cgt tca gat	aat act ttt gat gaa	cag gtt	4167
Val Phe Ser His	Ser Arg Ser Asp	Asn Thr Phe Asp Glu Gln	Val	
1235	1240	1245		
aaa aat cac gcg	aca tta acg atg	atg tcg ggt ttt gcc	caa tat	4212
Lys Asn His Ala	Thr Leu Thr Met	Met Ser Gly Phe Ala Gln	Tyr	
1250	1255	1260		
caa tgg ggc gat	tta caa ttt ggt	gta aac gtg gga acg	gga atc	4257
Gln Trp Gly Asp	Leu Gln Phe Gly	Val Asn Val Gly Thr Gly	Ile	
1265	1270	1275		
agt gcg agt aaa	atg gct gaa gaa	caa agc cga aaa att	cat cga	4302
Ser Ala Ser Lys	Met Ala Glu Glu	Gln Ser Arg Lys Ile His	Arg	
1280	1285	1290		
aaa gcg ata aat	tat ggc gtg aat	gca agt tat cag ttc	cgt tta	4347
Lys Ala Ile Asn	Tyr Gly Val Asn	Ala Ser Tyr Gln Phe Arg	Leu	
1295	1300	1305		

ggg caa ttg ggc att cag cct tat ttt gga gtt aat cgc tat ttt Gly Gln Leu Gly Ile Gln Pro Tyr Phe Gly Val Asn Arg Tyr Phe 1310 1315 1320	4392
att gaa cgt gaa aat tat caa tct gag gaa gtg aaa gtg aaa acg Ile Glu Arg Glu Asn Tyr Gln Ser Glu Glu Val Lys Val Lys Thr 1325 1330 1335	4437
cct agc ctt gca ttt aat cgc tat aat gct ggc att cga gtt gat Pro Ser Leu Ala Phe Asn Arg Tyr Asn Ala Gly Ile Arg Val Asp 1340 1345 1350	4482
tat aca ttt act ccg aca gat aat atc agc gtt aag cct tat ttc Tyr Thr Phe Thr Pro Thr Asp Asn Ile Ser Val Lys Pro Tyr Phe 1355 1360 1365	4527
ttc gtc aat tat gtt gat gtt tca aac gct aac gta caa acc acg Phe Val Asn Tyr Val Asp Val Ser Asn Ala Asn Val Gln Thr Thr 1370 1375 1380	4572
gta aat agc acg gtg ttg caa caa cca ttt gga cgt tat tgg caa Val Asn Ser Thr Val Leu Gln Gln Pro Phe Gly Arg Tyr Trp Gln 1385 1390 1395	4617
aaa gaa gtg gga tta aaa gcg gaa att tta cat ttc caa ctt tct Lys Glu Val Gly Leu Lys Ala Glu Ile Leu His Phe Gln Leu Ser 1400 1405 1410	4662
gct ttt att tct aaa tct caa ggt tcg caa ctc ggc aaa cag caa Ala Phe Ile Ser Lys Ser Gln Gly Ser Gln Leu Gly Lys Gln Gln 1415 1420 1425	4707
aat gtg ggc gtg aaa ttg ggg tat cgt tgg taa aaatcaacat Asn Val Gly Val Lys Leu Gly Tyr Arg Trp 1430 1435	4750
aattgtatcg tttattgata aacaaggtgg ggcagatccc accttttttta tttcaataat	4810
ggaactttat ttaattaaga gcatctaagt agcaccat ataggggatt aattaagagg	4870
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cacttccaac aatcactgat aaaacagttg tatattcctg caataaaca actgtaactg	5050
ccgtgtatca atttgaaaac caagaaccag ttgtgcaat ggtaagtgtg ggcgatggca	5110
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Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile
20 25 30

Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Ser
35 40 45

Val Gly Ala Lys Asn Ile Glu Val Tyr Asn Lys Glu Gly Thr Leu Val
50 55 60

Gly Thr Ser Met Thr Lys Ala Pro Met Ile Asp Phe Ser Val Val Ser
65 70 75 80

Arg Asn Gly Val Ala Ala Leu Val Gly Asp Gln Tyr Ile Val Ser Val
85 90 95

Ala His Asn Gly Gly Tyr Asn Ser Val Asp Phe Gly Ala Glu Gly Pro
100 105 110

Asn Pro Asp Gln His Arg Phe Thr Tyr Gln Ile Val Lys Arg Asn Asn
115 120 125

Tyr Lys Pro Gly Lys Asp Asn Pro Tyr His Gly Asp Tyr His Met Pro
130 135 140

Arg Leu His Lys Phe Val Thr Asp Ala Glu Pro Ala Lys Met Thr Asp
145 150 155 160

Asn Met Asn Gly Lys Asn Tyr Ala Asp Leu Ser Lys Tyr Pro Asp Arg
165 170 175

Val Arg Ile Gly Thr Gly Glu Gln Trp Trp Arg Thr Asp Glu Glu Gln
180 185 190

Lys Gln Gly Ser Lys Ser Ser Trp Leu Ala Asp Ala Tyr Leu Trp Arg
195 200 205

Ile Ala Gly Asn Thr His Ser Gln Ser Gly Ala Gly Asn Gly Thr Val
 210 215 220

Asn Leu Ser Gly Asp Ile Thr Lys Pro Asn Asn Tyr Gly Pro Leu Pro
 225 230 235 240

Thr Gly Val Ser Phe Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp
 245 250 255

Ala Ile Lys Gln Lys Trp Leu Ile Asn Gly Val Leu Gln Thr Gly Asn
 260 265 270

Pro Phe Ser Gly Ala Gly Asn Gly Phe Gln Leu Ile Arg Lys Asn Trp
 275 280 285

Phe Tyr Asp Asn Val Phe Val Glu Asp Leu Pro Ile Thr Phe Leu Glu
 290 295 300

Pro Arg Ser Asn Gly His Tyr Ser Phe Thr Ser Asn Asn Asn Gly Thr
 305 310 315 320

Gly Thr Val Thr Gln Thr Asn Glu Lys Val Ser Met Pro Gln Phe Lys
 325 330 335

Val Arg Thr Val Gln Leu Phe Asn Glu Ala Leu Lys Glu Lys Asp Lys
 340 345 350

Glu Pro Val Tyr Ala Ala Gly Gly Val Asn Ala Tyr Lys Pro Arg Leu
 355 360 365

Asn Asn Gly Lys Asn Ile Tyr Phe Gly Asp Arg Gly Thr Gly Thr Leu
 370 375 380

Thr Ile Glu Asn Asn Ile Asn Gln Gly Ala Gly Gly Leu Tyr Phe Glu
 385 390 395 400

Gly Asn Phe Thr Val Ser Ser Glu Asn Asn Ala Thr Trp Gln Gly Ala
 405 410 415

Gly Val His Val Gly Glu Asp Ser Thr Val Thr Trp Lys Val Asn Gly
 420 425 430

Val Glu His Asp Arg Leu Ser Lys Ile Gly Lys Gly Thr Leu His Ile

435		440		445
Gln Ala Lys Gly Glu Asn Leu Gly Ser Ile Ser Val Gly Asp Gly Lys				
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Val Ile Leu Asp Gln Gln Ala Asp Glu Asn Asn Gln Lys Gln Ala Phe				
465		470		475 480
Lys Glu Val Gly Ile Val Ser Gly Arg Ala Thr Val Gln Leu Asn Ser				
	485		490	495
Ala Asp Gln Val Asp Pro Asn Asn Ile Tyr Phe Gly Phe Arg Gly Gly				
	500		505	510
Arg Leu Asp Leu Asn Gly His Ser Leu Thr Phe Lys Arg Ile Gln Asn				
	515		520	525
Thr Asp Glu Gly Ala Met Ile Val Asn His Asn Thr Thr Gln Val Ala				
	530		535	540
Asn Ile Thr Ile Thr Gly Asn Glu Ser Ile Thr Ala Pro Ser Asn Lys				
545		550		555 560
Asn Asn Ile Asn Lys Leu Asp Tyr Ser Lys Glu Ile Ala Tyr Asn Gly				
	565		570	575
Trp Phe Gly Glu Thr Asp Glu Asn Lys His Asn Gly Arg Leu Asn Leu				
	580		585	590
Ile Tyr Lys Pro Thr Thr Glu Asp Arg Thr Leu Leu Leu Ser Gly Gly				
	595		600	605
Thr Asn Leu Lys Gly Asn Ile Thr Gln Glu Gly Gly Thr Leu Val Phe				
	610		615	620
Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His Leu Asn Arg Pro Asn				
625		630		635 640
Glu Leu Gly Arg Pro Gln Gly Glu Val Val Ile Asp Asp Asp Trp Ile				
	645		650	655
Thr Arg Thr Phe Lys Ala Glu Asn Phe Gln Ile Lys Gly Gly Ser Ala				
	660		665	670

Val Val Ser Arg Asn Val Ser Ser Ile Glu Gly Asn Trp Thr Val Ser
675 680 685

Asn Asn Ala Asn Ala Ala Phe Gly Val Val Pro Asn Gln Gln Asn Thr
690 695 700

Ile Cys Thr Arg Ser Asp Trp Thr Gly Leu Thr Thr Cys Lys Thr Val
705 710 715 720

Asp Leu Thr Asp Thr Lys Val Ile Asn Ser Ile Pro Thr Thr Gln Ile
725 730 735

Asn Gly Ser Ile Asn Leu Thr Asp Asn Ala Thr Val Asn Ile His Gly
740 745 750

Leu Ala Lys Leu Asn Gly Asn Val Thr Leu Ile Asn His Ser Gln Phe
755 760 765

Thr Leu Ser Asn Asn Ala Thr Gln Thr Gly Asn Ile Gln Leu Ser Asn
770 775 780

His Ala Asn Ala Thr Val Asp Asn Ala Asn Leu Asn Gly Asn Val His
785 790 795 800

Leu Thr Asp Ser Ala Gln Phe Ser Leu Lys Asn Ser His Phe Ser His
805 810 815

Gln Ile Gln Gly Asp Lys Asp Thr Thr Val Thr Leu Glu Asn Ala Thr
820 825 830

Trp Thr Met Pro Ser Asp Ala Thr Leu Gln Asn Leu Thr Leu Asn Asn
835 840 845

Ser Thr Val Thr Leu Asn Ser Ala Tyr Ser Ala Ser Ser Asn Asn Ala
850 855 860

Pro Arg His Arg Arg Ser Leu Glu Thr Glu Thr Thr Pro Thr Ser Ala
865 870 875 880

Glu His Arg Phe Asn Thr Leu Thr Val Asn Gly Lys Leu Ser Gly Gln
885 890 895

Gly Thr Phe Gln Phe Thr Ser Ser Leu Phe Gly Tyr Lys Ser Asp Lys
 900 905 910

Leu Lys Leu Ser Asn Asp Ala Glu Gly Asp Tyr Thr Leu Ser Val Arg
 915 920 925

Asn Thr Gly Lys Glu Pro Glu Ala Leu Glu Gln Leu Thr Leu Val Glu
 930 935 940

Ser Lys Asp Asn Lys Pro Leu Ser Asp Lys Leu Lys Phe Thr Leu Glu
 945 950 955 960

Asn Asp His Val Asp Ala Gly Ala Leu Arg Tyr Lys Leu Val Lys Asn
 965 970 975

Asn Gly Glu Phe Arg Leu His Asn Pro Ile Lys Glu Gln Glu Leu Arg
 980 985 990

Asn Asp Leu Val Arg Ala Glu Gln Ala Glu Arg Thr Leu Glu Ala Lys
 995 1000 1005

Gln Val Glu Gln Thr Ala Glu Thr Gln Thr Ser Asn Ala Arg Val
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Arg Ser Lys Arg Ala Val Phe Ser Asp Thr Leu Pro Asp Gln Ser
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Gln Leu Asp Val Leu Gln Ala Glu Gln Val Glu Pro Thr Ala Glu
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Lys Gln Lys Asn Lys Ala Lys Lys Val Arg Ser Lys Arg Ala Val
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Phe Ser Asp Thr Leu Pro Asp Gln Ser Gln Leu Asp Val Leu Gln
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Ala Glu Gln Val Glu Pro Thr Ala Glu Lys Gln Lys Asn Lys Ala
 1085 1090 1095

Lys Lys Val Arg Ser Lys Arg Ala Ala Arg Glu Phe Ser Asp Thr
 1100 1105 1110

Pro Leu Asp Leu Ser Arg Leu Lys Val Leu Glu Val Lys Leu Glu
 1115 1120 1125

 Val Ile Asn Ala Gln Gln Gln Val Lys Lys Glu Pro Gln Asp Gln
 1130 1135 1140

 Glu Lys Gln Arg Lys Gln Lys Asp Leu Ile Ser Arg Tyr Ser Asn
 1145 1150 1155

 Ser Ala Leu Ser Glu Leu Ser Ala Thr Val Asn Ser Met Leu Ser
 1160 1165 1170

 Val Gln Asp Glu Leu Asp Arg Leu Phe Val Asp Gln Ala Gln Ser
 1175 1180 1185

 Ala Val Trp Thr Asn Ile Ala Gln Asp Lys Arg Arg Tyr Asp Ser
 1190 1195 1200

 Asp Ala Phe Arg Ala Tyr Gln Gln Lys Thr Asn Leu Arg Gln Ile
 1205 1210 1215

 Gly Val Gln Lys Ala Leu Ala Asn Gly Arg Ile Gly Ala Val Phe
 1220 1225 1230

 Ser His Ser Arg Ser Asp Asn Thr Phe Asp Glu Gln Val Lys Asn
 1235 1240 1245

 His Ala Thr Leu Thr Met Met Ser Gly Phe Ala Gln Tyr Gln Trp
 1250 1255 1260

 Gly Asp Leu Gln Phe Gly Val Asn Val Gly Thr Gly Ile Ser Ala
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 Ser Lys Met Ala Glu Glu Gln Ser Arg Lys Ile His Arg Lys Ala
 1280 1285 1290

 Ile Asn Tyr Gly Val Asn Ala Ser Tyr Gln Phe Arg Leu Gly Gln
 1295 1300 1305

 Leu Gly Ile Gln Pro Tyr Phe Gly Val Asn Arg Tyr Phe Ile Glu
 1310 1315 1320

 Arg Glu Asn Tyr Gln Ser Glu Glu Val Lys Val Lys Thr Pro Ser

1325		1330		1335
Leu Ala Phe Asn Arg Tyr Asn	Ala Gly Ile Arg Val	Asp Tyr Thr		
1340	1345	1350		
Phe Thr Pro Thr Asp Asn Ile	Ser Val Lys Pro Tyr	Phe Phe Val		
1355	1360	1365		
Asn Tyr Val Asp Val Ser Asn	Ala Asn Val Gln Thr	Thr Val Asn		
1370	1375	1380		
Ser Thr Val Leu Gln Gln Pro	Phe Gly Arg Tyr Trp	Gln Lys Glu		
1385	1390	1395		
Val Gly Leu Lys Ala Glu Ile	Leu His Phe Gln Leu	Ser Ala Phe		
1400	1405	1410		
Ile Ser Lys Ser Gln Gly Ser	Gln Leu Gly Lys Gln	Gln Asn Val		
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Gly Val Lys Leu Gly Tyr Arg	Trp			
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aataagatta ccactaagt attaagccaa aacctagaaa ttttggctta attactatat	240
aattttactc ctttattttc ttttgtgcct tttagttagt tegtttttta gctgaaatcc	300
ctcagaaaat caccgcactt ttattgttca atagtcgttt aaccacgtat tttttaatac	360
gaaaaattac ttaattaaat aaacatt atg aaa aaa act gta ttt cgt ctt aat	414
Met Lys Lys Thr Val Phe Arg Leu Asn	

ttt cta acc gct tgt att tca tta ggg ata gta tcg caa gcg tgg gca	462
Phe Leu Thr Ala Cys Ile Ser Leu Gly Ile Val Ser Gln Ala Trp Ala	
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ggt cac act tat ttt ggg att gac tac caa tat tat cgt gat ttt gcc	510
Gly His Thr Tyr Phe Gly Ile Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala	
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gag aat aaa ggg aag ttt aca gtt ggg gct caa gat att gat atc tac	558
Glu Asn Lys Gly Lys Phe Thr Val Gly Ala Gln Asp Ile Asp Ile Tyr	
45 50 55	
aat aaa aaa ggg gaa atg ata ggt acg atg atg aaa ggt gtg cct atg	606
Asn Lys Lys Gly Glu Met Ile Gly Thr Met Met Lys Gly Val Pro Met	
60 65 70	
cct gat tta tct tcc atg gtt cgt ggt ggt tat tca aca ttg ata agt	654
Pro Asp Leu Ser Ser Met Val Arg Gly Gly Tyr Ser Thr Leu Ile Ser	
75 80 85	
gag cag cat tta att agc gtc gca cat aat gta ggg tat gat gtc gtt	702
Glu Gln His Leu Ile Ser Val Ala His Asn Val Gly Tyr Asp Val Val	
90 95 100 105	
gat ttt ggt atg gag ggg gaa aat cca gac caa cat cgt ttt aag tat	750
Asp Phe Gly Met Glu Gly Glu Asn Pro Asp Gln His Arg Phe Lys Tyr	
110 115 120	
aaa gtt gtt aaa cga tat aat tat aag agc ggt gat aga caa tat aat	798
Lys Val Val Lys Arg Tyr Asn Tyr Lys Ser Gly Asp Arg Gln Tyr Asn	
125 130 135	
gat tat caa cat cca aga tta gag aaa ttt gta acg gaa act gca cct	846
Asp Tyr Gln His Pro Arg Leu Glu Lys Phe Val Thr Glu Thr Ala Pro	
140 145 150	
att gaa atg gtt tca tat atg gat ggt aat cat tac aaa aat ttt aat	894
Ile Glu Met Val Ser Tyr Met Asp Gly Asn His Tyr Lys Asn Phe Asn	
155 160 165	
caa tat cct ttg cga gtt aga gtt gga agt ggg cat caa tgg tgg aaa	942
Gln Tyr Pro Leu Arg Val Arg Val Gly Ser Gly His Gln Trp Trp Lys	
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gac gat aat aat aaa acc att gga gac tta gcc tat gga ggt tca tgg	990
Asp Asp Asn Asn Lys Thr Ile Gly Asp Leu Ala Tyr Gly Gly Ser Trp	
190 195 200	
tta ata ggt gga aat acc ttt gaa gat gga cca gct ggt aac ggt aca	1038
Leu Ile Gly Gly Asn Thr Phe Glu Asp Gly Pro Ala Gly Asn Gly Thr	
205 210 215	
tta gaa tta aat ggg cga gta caa aat cct aat aaa tat ggt cca cta	1086
Leu Glu Leu Asn Gly Arg Val Gln Asn Pro Asn Lys Tyr Gly Pro Leu	
220 225 230	

cct acg gca ggt tca ttc ggg gat agt ggt tct cca atg ttt att tat	1134
Pro Thr Ala Gly Ser Phe Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr	
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gat aag gaa gtt aag aaa tgg tta tta aat ggc gtg tta cgt gaa gga	1182
Asp Lys Glu Val Lys Lys Trp Leu Leu Asn Gly Val Leu Arg Glu Gly	
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aat cct tat gct gca gta gga aac agc tat caa att aca cga aaa gat	1230
Asn Pro Tyr Ala Ala Val Gly Asn Ser Tyr Gln Ile Thr Arg Lys Asp	
270 275 280	
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Tyr Phe Gln Gly Ile Leu Asn Gln Asp Ile Thr Ala Asn Phe Trp Asp	
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act aat gct gaa tat aga ttt aat ata ggg agt gac cac aat gga aga	1326
Thr Asn Ala Glu Tyr Arg Phe Asn Ile Gly Ser Asp His Asn Gly Arg	
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gtg gca aca atc aaa agt aca tta cct aaa aaa gct att cag cct gaa	1374
Val Ala Thr Ile Lys Ser Thr Leu Pro Lys Lys Ala Ile Gln Pro Glu	
315 320 325	
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Arg Ile Val Gly Leu Tyr Asp Asn Ser Gln Leu His Asp Ala Arg Asp	
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Lys Asn Gly Asp Glu Ser Pro Ser Tyr Lys Gly Pro Asn Pro Trp Ser	
350 355 360	
cca gca tta cat cat ggg aaa agt att tac ttt ggc gat caa gga aca	1518
Pro Ala Leu His His Gly Lys Ser Ile Tyr Phe Gly Asp Gln Gly Thr	
365 370 375	
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Gly Thr Leu Thr Ile Glu Asn Asn Ile Asn Gln Gly Ala Gly Gly Leu	
380 385 390	
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Tyr Phe Glu Gly Asn Phe Val Val Lys Gly Asn Gln Asn Asn Ile Thr	
395 400 405	
tgg caa ggt gca ggc gtt tct gtt gga gaa gaa agt act gtt gaa tgg	1662
Trp Gln Gly Ala Gly Val Ser Val Gly Glu Glu Ser Thr Val Glu Trp	
410 415 420 425	
cag gtg cat aat cca gaa ggc gat cgc tta tcc aaa att ggg ctg gga	1710
Gln Val His Asn Pro Glu Gly Asp Arg Leu Ser Lys Ile Gly Leu Gly	
430 435 440	
acc tta ctt gtt aat ggt aaa ggg aaa aac tta gga agc ctg agt gtc	1758
Thr Leu Leu Val Asn Gly Lys Gly Lys Asn Leu Gly Ser Leu Ser Val	
445 450 455	

ggt aac ggt ttg gtt gtg tta gat caa caa gca gat gaa tca ggt caa Gly Asn Gly Leu Val Val Leu Asp Gln Gln Ala Asp Glu Ser Gly Gln 460 465 470	1806
aaa caa gcc ttt aaa gaa gtt ggc att gta agt ggt aga gct acc gtt Lys Gln Ala Phe Lys Glu Val Gly Ile Val Ser Gly Arg Ala Thr Val 475 480 485	1854
caa cta aat agt gca gat caa gtt gat cct aac aat att tat ttc ggc Gln Leu Asn Ser Ala Asp Gln Val Asp Pro Asn Asn Ile Tyr Phe Gly 490 495 500 505	1902
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cgt atc caa aat acg gat gaa ggc gcg atg att gtg aac cac aac gct Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn His Asn Ala 525 530 535	1998
tct caa acc gca aat att acg att aca ggc aac gca act att aat tca Ser Gln Thr Ala Asn Ile Thr Ile Thr Gly Asn Ala Thr Ile Asn Ser 540 545 550	2046
gat agc aaa caa ctt act aat aaa aaa gat att gca ttt aac ggc tgg Asp Ser Lys Gln Leu Thr Asn Lys Lys Asp Ile Ala Phe Asn Gly Trp 555 560 565	2094
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tat caa cca gtt aat gca gaa aat cat ttg ttg ctt tct ggg ggg aca Tyr Gln Pro Val Asn Ala Glu Asn His Leu Leu Leu Ser Gly Gly Thr 590 595 600	2190
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ggt cgt cca acg cct cat gct tac aat cat tta aga aga gac ttg tct Gly Arg Pro Thr Pro His Ala Tyr Asn His Leu Arg Arg Asp Leu Ser 620 625 630	2286
aac atg gaa ggt atc cca caa ggc gaa att gtg tgg gat cac gat tgg Asn Met Glu Gly Ile Pro Gln Gly Glu Ile Val Trp Asp His Asp Trp 635 640 645	2334
atc aac cgc aca ttt aaa gct gaa aac ttc caa att aaa ggc gga agt Ile Asn Arg Thr Phe Lys Ala Glu Asn Phe Gln Ile Lys Gly Gly Ser 650 655 660 665	2382
gcg gtg gtt tct cgc aat gtt tct tca att gag gga aat tgg aca gtc Ala Val Val Ser Arg Asn Val Ser Ser Ile Glu Gly Asn Trp Thr Val 670 675 680	2430
agc aat aat gca aat gcc aca ttt ggt gtt gtg cca aat cag caa aat	2478

Ser	Asn	Asn	Ala	Asn	Ala	Thr	Phe	Gly	Val	Val	Pro	Asn	Gln	Gln	Asn		
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acc	att	tgc	acg	cgt	tca	gat	tgg	aca	gga	tta	acg	act	tgt	aaa	aca	2526	
Thr	Ile	Cys	Thr	Arg	Ser	Asp	Trp	Thr	Gly	Leu	Thr	Thr	Cys	Lys	Thr		
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gtt	gat	tta	acc	gat	aaa	aaa	gtt	att	aat	tcc	ata	ccg	aca	aca	caa	2574	
Val	Asp	Leu	Thr	Asp	Lys	Lys	Val	Ile	Asn	Ser	Ile	Pro	Thr	Thr	Gln		
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att	aat	ggg	tct	att	aat	tta	act	gat	aat	gca	aca	gtg	aat	att	cat	2622	
Ile	Asn	Gly	Ser	Ile	Asn	Leu	Thr	Asp	Asn	Ala	Thr	Val	Asn	Ile	His		
730					735					740					745		
ggg	tta	gca	aaa	ctt	aat	ggg	aat	gtc	act	tta	ata	gat	cac	agc	caa	2670	
Gly	Leu	Ala	Lys	Leu	Asn	Gly	Asn	Val	Thr	Leu	Ile	Asp	His	Ser	Gln		
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Phe	Thr	Leu	Ser	Asn	Asn	Ala	Thr	Gln	Ala	Gly	Asn	Ile	Lys	Leu	Ser		
		765						770					775				
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Asn	His	Ala	Asn	Ala	Thr	Val	Asp	Asn	Ala	Asn	Leu	Asn	Gly	Asn	Val		
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aat	tta	atg	gat	tct	gct	caa	ttt	tct	tta	aaa	aac	agc	cat	ttt	tcg	2814	
Asn	Leu	Met	Asp	Ser	Ala	Gln	Phe	Ser	Leu	Lys	Asn	Ser	His	Phe	Ser		
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cac	caa	atc	caa	ggg	ggg	gaa	gac	aca	aca	gtg	atg	ttg	gaa	aat	gcg	2862	
His	Gln	Ile	Gln	Gly	Gly	Glu	Asp	Thr	Thr	Val	Met	Leu	Glu	Asn	Ala		
810					815					820					825		
act	tgg	aca	atg	cct	agc	gat	acc	aca	ttg	cag	aat	tta	acg	cta	aat	2910	
Thr	Trp	Thr	Met	Pro	Ser	Asp	Thr	Thr	Leu	Gln	Asn	Leu	Thr	Leu	Asn		
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Asn	Ser	Thr	Val	Thr	Leu	Asn	Ser	Ala	Tyr	Ser	Ala	Ile	Ser	Asn	Asn		
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tcg	gca	gaa	cat	cgt	ttc	aac	aca	ttg	aca	gta	aat	ggg	aaa	ttg	agc	3054	
Ser	Ala	Glu	His	Arg	Phe	Asn	Thr	Leu	Thr	Val	Asn	Gly	Lys	Leu	Ser		
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gat	aaa	tta	aaa	tta	tcc	aat	gac	gct	gag	ggc	gat	tac	aca	tta	tct	3150	
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Val Arg Asn Thr Gly Lys Glu Pro	Val Thr Phe Gly Gln Leu Thr Leu		
925	930	935	
gtt gaa agc aaa gat aat aaa ccg	tta tca gac aaa ctc aca ttc acg		3246
Val Glu Ser Lys Asp Asn Lys Pro	Leu Ser Asp Lys Leu Thr Phe Thr		
940	945	950	
tta gaa aat gac cac gtt gat gca	ggg gca tta cgt tat aaa tta gtg		3294
Leu Glu Asn Asp His Val Asp Ala	Gly Ala Leu Arg Tyr Lys Leu Val		
955	960	965	
aag aat gat ggc gaa ttc cgc tta	cat aac cca ata aaa gag cag gaa		3342
Lys Asn Asp Gly Glu Phe Arg Leu	His Asn Pro Ile Lys Glu Gln Glu		
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ttg cgc tct gat tta gta aga gca	gag caa gca gaa cga aca tta gaa		3390
Leu Arg Ser Asp Leu Val Arg Ala	Glu Gln Ala Glu Arg Thr Leu Glu		
990	995	1000	
gcc aaa caa gtt gaa cag act gct	aaa aca caa aca agt aag gca		3435
Ala Lys Gln Val Glu Gln Thr Ala	Lys Thr Gln Thr Ser Lys Ala		
1005	1010	1015	
aga gtg cgg tca aga aga gcg gtg	ttt tct gat ccc ctg cct gct		3480
Arg Val Arg Ser Arg Arg Ala Val	Phe Ser Asp Pro Leu Pro Ala		
1020	1025	1030	
caa agc ctg tta aac gca tta gaa	gcc aaa caa gct ctg act act		3525
Gln Ser Leu Leu Asn Ala Leu Glu	Ala Lys Gln Ala Leu Thr Thr		
1035	1040	1045	
gaa aca caa aca agt aag gca aaa	aaa gtg cgg tca aaa aga gct		3570
Glu Thr Gln Thr Ser Lys Ala Lys	Lys Val Arg Ser Lys Arg Ala		
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gcg aga gag ttt tct gat acc ctg	cct gat caa ata tta caa gcc		3615
Ala Arg Glu Phe Ser Asp Thr Leu	Pro Asp Gln Ile Leu Gln Ala		
1065	1070	1075	
gca ctt gag gtt att gat gcc caa	cag caa gtg aaa aaa gaa cct		3660
Ala Leu Glu Val Ile Asp Ala Gln	Gln Gln Gln Val Lys Lys Glu Pro		
1080	1085	1090	
caa act caa gag gaa gaa gag aaa	aga caa cgc aaa caa aaa gaa		3705
Gln Thr Gln Glu Glu Glu Glu Lys	Arg Gln Arg Lys Gln Lys Glu		
1095	1100	1105	
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Leu Ile Ser Arg Tyr Ser Asn Ser	Ala Leu Ser Glu Leu Ser Ala		
1110	1115	1120	
aca gta aat agt atg ctt tcc gtt	caa gat gaa ttg gat cgt ctt		3795
Thr Val Asn Ser Met Leu Ser Val	Gln Asp Glu Leu Asp Arg Leu		
1125	1130	1135	

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Phe Val Asp Gln Ala Gln Ser Ala Val Trp Thr Asn Ile Ala Gln	
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gat aaa aga cgc tat gat tct gat gcg ttc cgt gct tat cag cag	3885
Asp Lys Arg Arg Tyr Asp Ser Asp Ala Phe Arg Ala Tyr Gln Gln	
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Lys Thr Asn Leu Arg Gln Ile Gly Val Gln Lys Ala Leu Asp Asn	
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cga aaa att cat cga aaa gcg ata aat tat ggt gtg aat gca agt	4155
Arg Lys Ile His Arg Lys Ala Ile Asn Tyr Gly Val Asn Ala Ser	
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Tyr Gln Phe Arg Leu Gly Gln Leu Gly Ile Gln Pro Tyr Leu Gly	
1260 1265 1270	
gtt aat cga tat ttt att gaa cgt gaa aat tat caa tct gaa gaa	4245
Val Asn Arg Tyr Phe Ile Glu Arg Glu Asn Tyr Gln Ser Glu Glu	
1275 1280 1285	
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Val Lys Val Gln Thr Pro Ser Leu Val Phe Asn Arg Tyr Asn Ala	
1290 1295 1300	
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Gly Ile Arg Val Asp Tyr Thr Phe Thr Pro Thr Asp Asn Ile Ser	
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Ile Lys Pro Tyr Phe Phe Val Asn Tyr Val Asp Val Ser Asn Ala	
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Asn Val Gln Thr Thr Val Asn Arg Thr Met Leu Gln Gln Ser Phe	
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Gly Arg Tyr Trp	Gln Lys Glu Val Gly	Leu Lys Ala Glu Ile	Leu	
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His Phe Gln Leu	Ser Ala Phe Ile Ser	Lys Ser Gln Gly Ser	Gln	
1365	1370	1375		
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Leu Gly Lys Gln	Gln Asn Val Gly Val	Lys Leu Gly Tyr Arg	Trp	
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Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe Thr				
35	40	45		
Val Gly Ala Gln Asp Ile Asp Ile Tyr Asn Lys Lys Gly Glu Met Ile				
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Gly Thr Met Met Lys Gly Val Pro Met Pro Asp Leu Ser Ser Met Val				
65	70	75	80	
Arg Gly Gly Tyr Ser Thr Leu Ile Ser Glu Gln His Leu Ile Ser Val				
85	90	95		
Ala His Asn Val Gly Tyr Asp Val Val Asp Phe Gly Met Glu Gly Glu				
100	105	110		

Asn Pro Asp Gln His Arg Phe Lys Tyr Lys Val Val Lys Arg Tyr Asn
 115 120 125

Tyr Lys Ser Gly Asp Arg Gln Tyr Asn Asp Tyr Gln His Pro Arg Leu
 130 135 140

Glu Lys Phe Val Thr Glu Thr Ala Pro Ile Glu Met Val Ser Tyr Met
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Asp Gly Asn His Tyr Lys Asn Phe Asn Gln Tyr Pro Leu Arg Val Arg
 165 170 175

Val Gly Ser Gly His Gln Trp Trp Lys Asp Asp Asn Asn Lys Thr Ile
 180 185 190

Gly Asp Leu Ala Tyr Gly Gly Ser Trp Leu Ile Gly Gly Asn Thr Phe
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Glu Asp Gly Pro Ala Gly Asn Gly Thr Leu Glu Leu Asn Gly Arg Val
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Gln Asn Pro Asn Lys Tyr Gly Pro Leu Pro Thr Ala Gly Ser Phe Gly
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Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp Lys Glu Val Lys Lys Trp
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Leu Leu Asn Gly Val Leu Arg Glu Gly Asn Pro Tyr Ala Ala Val Gly
 260 265 270

Asn Ser Tyr Gln Ile Thr Arg Lys Asp Tyr Phe Gln Gly Ile Leu Asn
 275 280 285

Gln Asp Ile Thr Ala Asn Phe Trp Asp Thr Asn Ala Glu Tyr Arg Phe
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Asn Ile Gly Ser Asp His Asn Gly Arg Val Ala Thr Ile Lys Ser Thr
 305 310 315 320

Leu Pro Lys Lys Ala Ile Gln Pro Glu Arg Ile Val Gly Leu Tyr Asp
 325 330 335

Asn Ser Gln Leu His Asp Ala Arg Asp Lys Asn Gly Asp Glu Ser Pro
 340 345 350

Ser Tyr Lys Gly Pro Asn Pro Trp Ser Pro Ala Leu His His Gly Lys
 355 360 365

Ser Ile Tyr Phe Gly Asp Gln Gly Thr Gly Thr Leu Thr Ile Glu Asn
 370 375 380

Asn Ile Asn Gln Gly Ala Gly Gly Leu Tyr Phe Glu Gly Asn Phe Val
 385 390 395 400

Val Lys Gly Asn Gln Asn Asn Ile Thr Trp Gln Gly Ala Gly Val Ser
 405 410 415

Val Gly Glu Glu Ser Thr Val Glu Trp Gln Val His Asn Pro Glu Gly
 420 425 430

Asp Arg Leu Ser Lys Ile Gly Leu Gly Thr Leu Leu Val Asn Gly Lys
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Gly Lys Asn Leu Gly Ser Leu Ser Val Gly Asn Gly Leu Val Val Leu
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Asp Gln Gln Ala Asp Glu Ser Gly Gln Lys Gln Ala Phe Lys Glu Val
 465 470 475 480

Gly Ile Val Ser Gly Arg Ala Thr Val Gln Leu Asn Ser Ala Asp Gln
 485 490 495

Val Asp Pro Asn Asn Ile Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp
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Leu Asn Gly His Ser Leu Thr Phe Glu Arg Ile Gln Asn Thr Asp Glu
 515 520 525

Gly Ala Met Ile Val Asn His Asn Ala Ser Gln Thr Ala Asn Ile Thr
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Ile Thr Gly Asn Ala Thr Ile Asn Ser Asp Ser Lys Gln Leu Thr Asn
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Lys Lys Asp Ile Ala Phe Asn Gly Trp Phe Gly Glu Gln Asp Lys Ala

565

570

575

Lys Thr Asn Gly Arg Leu Asn Val Asn Tyr Gln Pro Val Asn Ala Glu
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Asn His Leu Leu Leu Ser Gly Gly Thr Asn Leu Asn Gly Asn Ile Thr
 595 600 605

Gln Asn Gly Gly Thr Leu Val Phe Ser Gly Arg Pro Thr Pro His Ala
 610 615 620

Tyr Asn His Leu Arg Arg Asp Leu Ser Asn Met Glu Gly Ile Pro Gln
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Gly Glu Ile Val Trp Asp His Asp Trp Ile Asn Arg Thr Phe Lys Ala
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Glu Asn Phe Gln Ile Lys Gly Gly Ser Ala Val Val Ser Arg Asn Val
 660 665 670

Ser Ser Ile Glu Gly Asn Trp Thr Val Ser Asn Asn Ala Asn Ala Thr
 675 680 685

Phe Gly Val Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp
 690 695 700

Trp Thr Gly Leu Thr Thr Cys Lys Thr Val Asp Leu Thr Asp Lys Lys
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Val Ile Asn Ser Ile Pro Thr Thr Gln Ile Asn Gly Ser Ile Asn Leu
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Thr Asp Asn Ala Thr Val Asn Ile His Gly Leu Ala Lys Leu Asn Gly
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Thr Gln Ala Gly Asn Ile Lys Leu Ser Asn His Ala Asn Ala Thr Val
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Asp Asn Ala Asn Leu Asn Gly Asn Val Asn Leu Met Asp Ser Ala Gln
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Phe Ser Leu Lys Asn Ser His Phe Ser His Gln Ile Gln Gly Gly Glu
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Asp Thr Thr Val Met Leu Glu Asn Ala Thr Trp Thr Met Pro Ser Asp
820 825 830

Thr Thr Leu Gln Asn Leu Thr Leu Asn Asn Ser Thr Val Thr Leu Asn
835 840 845

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850 855 860

Ser Leu Glu Thr Glu Thr Thr Pro Thr Ser Ala Glu His Arg Phe Asn
865 870 875 880

Thr Leu Thr Val Asn Gly Lys Leu Ser Gly Gln Gly Thr Phe Gln Phe
885 890 895

Thr Ser Ser Leu Phe Gly Tyr Lys Ser Asp Lys Leu Lys Leu Ser Asn
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915 920 925

Pro Val Thr Phe Gly Gln Leu Thr Leu Val Glu Ser Lys Asp Asn Lys
930 935 940

Pro Leu Ser Asp Lys Leu Thr Phe Thr Leu Glu Asn Asp His Val Asp
945 950 955 960

Ala Gly Ala Leu Arg Tyr Lys Leu Val Lys Asn Asp Gly Glu Phe Arg
965 970 975

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980 985 990

Ala Glu Gln Ala Glu Arg Thr Leu Glu Ala Lys Gln Val Glu Gln Thr
995 1000 1005

Ala Lys Thr Gln Thr Ser Lys Ala Arg Val Arg Ser Arg Arg Ala
1010 1015 1020

Ser Lys Met Ala Glu Glu Gln Ser Arg Lys Ile His Arg Lys Ala
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Ile Asn Tyr Gly Val Asn Ala Ser Tyr Gln Phe Arg Leu Gly Gln
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Leu Gly Ile Gln Pro Tyr Leu Gly Val Asn Arg Tyr Phe Ile Glu
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Arg Glu Asn Tyr Gln Ser Glu Glu Val Lys Val Gln Thr Pro Ser
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725

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Asn Lys His Val Asp Ala Gly Ala Trp Arg Tyr Glu Leu Val Lys Lys
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Asn Gly Glu Phe Arg Leu His Asn Pro Ile Lys Glu Gln Glu Leu Arg
965 970 975

Asn Asp Leu Val Lys Ala Glu Gln Val Glu Arg Ala Leu Glu Ala Lys
980 985 990

Gln Ala Glu Leu Thr Thr Lys Lys Gln Lys Thr Glu Ala Lys Val Arg
995 1000 1005

Ser Lys Arg Ala Ala Phe Ser Asp Thr Pro Pro Asp Gln Ser Gln
1010 1015 1020

Leu Asn Ala Leu Gln Ala Glu Leu Glu Thr Ile Asn Ala Gln Gln
1025 1030 1035

Gln Val Ala Gln Ala Val Gln Asn Gln Lys Val Thr Ala Leu Asn
1040 1045 1050

Gln Lys Asn Glu Gln Val Lys Thr Thr Gln Asp Lys Ala Asn Leu
1055 1060 1065

Val Leu Ala Thr Ala Leu Val Glu Lys Glu Thr Ala Gln Ile Asp
1070 1075 1080

Phe Ala Asn Ala Lys Leu Ala Gln Leu Asn Leu Thr Gln Gln Leu
1085 1090 1095

Glu Lys Ala Leu Ala Val Ala Glu Gln Ala Glu Lys Glu Arg Lys
1100 1105 1110

Ala Gln Glu Gln Ala Lys Arg Gln Arg Lys Gln Lys Asp Leu Ile
1115 1120 1125

Ser Arg Tyr Ser Asn Ser Ala Leu Ser Glu Leu Ser Ala Thr Val
1130 1135 1140

Asn Ser Met Leu Ser Val Gln Asp Glu Leu Asp Arg Leu Phe Val
1145 1150 1155

Asp Gln Ala Gln Ser Ala Val Trp Thr Asn Ile Ser Gln Asp Lys
1160 1165 1170

Arg	Arg	Tyr	Asp	Ser	Asp	Ala	Phe	Arg	Ala	Tyr	Gln	Gln	Lys	Thr
1175						1180					1185			
Asn	Leu	Arg	Gln	Ile	Gly	Val	Gln	Lys	Ala	Leu	Ala	Asn	Gly	Arg
1190						1195					1200			
Ile	Gly	Ala	Val	Phe	Ser	His	Ser	Arg	Ser	Asp	Asn	Thr	Phe	Asp
1205						1210					1215			
Glu	Gln	Val	Lys	Asn	His	Ala	Thr	Leu	Thr	Met	Met	Ser	Gly	Phe
1220						1225					1230			
Ala	Gln	Tyr	Gln	Trp	Gly	Asp	Leu	Gln	Phe	Gly	Val	Asn	Val	Gly
1235						1240					1245			
Thr	Gly	Ile	Ser	Ala	Ser	Lys	Met	Ala	Glu	Glu	Gln	Ser	Arg	Lys
1250						1255					1260			
Ile	His	Arg	Lys	Ala	Ile	Asn	Tyr	Gly	Val	Asn	Ala	Ser	Tyr	Ser
1265						1270					1275			
Phe	His	Leu	Gly	Gln	Leu	Gly	Ile	Gln	Pro	Tyr	Phe	Gly	Val	Asn
1280						1285					1290			
Arg	Tyr	Phe	Ile	Glu	Arg	Lys	Asn	Tyr	Gln	Ser	Glu	Glu	Val	Lys
1295						1300					1305			
Val	Gln	Thr	Pro	Ser	Leu	Ala	Phe	Asn	Arg	Tyr	Asn	Ala	Gly	Val
1310						1315					1320			
Arg	Val	Asp	Tyr	Thr	Phe	Thr	Pro	Thr	Glu	Asn	Ile	Ser	Val	Lys
1325						1330					1335			
Pro	Tyr	Phe	Phe	Val	Asn	Tyr	Val	Asp	Val	Ser	Asn	Ala	Asn	Val
1340						1345					1350			
Gln	Thr	Thr	Val	Asn	Arg	Ala	Val	Leu	Gln	Gln	Pro	Phe	Gly	Arg
1355						1360					1365			
Tyr	Trp	Gln	Lys	Glu	Val	Gly	Leu	Lys	Ala	Glu	Ile	Leu	His	Phe
1370						1375					1380			

Gln Leu Ser Ala Phe Ile Ser Lys Ser Gln Gly Ser Gln Leu Gly
 1385 1390 1395

Lys Gln Arg Asn Met Gly Val Lys Leu Gly Tyr Arg Trp
 1400 1405 1410

<210> 18
 <211> 47
 <212> PRT
 <213> Haemophilus influenzae

<400> 18

Met Lys Lys Thr Val Phe Arg Leu Asn Phe Leu Thr Ala Cys Ile Ser
 1 5 10 15

Leu Gly Ile Val Ser Gln Ala Trp Ala Gly His Thr Tyr Phe Gly Ile
 20 25 30

Asp Tyr Gln Tyr Tyr Arg Asp Phe Ala Glu Asn Lys Gly Lys Phe
 35 40 45

<210> 19
 <211> 7
 <212> PRT
 <213> Haemophilus influenzae

<400> 19

Asn Pro Asp Gln His Arg Phe
 1 5

<210> 20
 <211> 11
 <212> PRT
 <213> Haemophilus influenzae

<400> 20

Gly Asp Ser Gly Ser Pro Met Phe Ile Tyr Asp
 1 5 10

<210> 21
 <211> 14
 <212> PRT
 <213> Haemophilus influenzae

<400> 21

Ile Asn Gln Gly Ala Gly Gly Leu Tyr Phe Glu Gly Asn Gly

1 5 10

<210> 22
<211> 7
<212> PRT
<213> Haemophilus influenzae

<400> 22

Asp Arg Leu Ser Lys Ile Gly
1 5

<210> 23
<211> 18
<212> PRT
<213> Haemophilus influenzae

<400> 23

Tyr Phe Gly Phe Arg Gly Gly Arg Leu Asp Leu Asn Gly His Ser Leu
1 5 10 15

Thr Phe

<210> 24
<211> 15
<212> PRT
<213> Haemophilus influenzae

<400> 24

Arg Ile Gln Asn Thr Asp Glu Gly Ala Met Ile Val Asn His Asn
1 5 10 15

<210> 25
<211> 9
<212> PRT
<213> Haemophilus influenzae

<400> 25

Leu Leu Leu Ser Gly Gly Thr Asn Leu
1 5

<210> 26
<211> 13
<212> PRT
<213> Haemophilus influenzae

<400> 26

Phe Ser Gly Arg Pro Thr Pro His Ala Tyr Asn His Leu
1 5 10

<210> 27
<211> 36
<212> PRT
<213> Haemophilus influenzae

<400> 27

Arg Thr Phe Lys Ala Glu Asn Phe Gln Ile Lys Gly Gly Ser Ala Val
1 5 10 15

Val Ser Arg Asn Val Ser Ser Ile Glu Gly Asn Trp Thr Val Ser Asn
20 25 30

Asn Ala Asn Ala
35

<210> 28
<211> 23
<212> PRT
<213> Haemophilus influenzae

<400> 28

Phe Gly Val Val Pro Asn Gln Gln Asn Thr Ile Cys Thr Arg Ser Asp
1 5 10 15

Trp Thr Gly Leu Thr Thr Cys
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<210> 29
<211> 7
<212> PRT
<213> Haemophilus influenzae

<400> 29

Lys Val Ile Asn Ser Ile Pro
1 5

<210> 30
<211> 14
<212> PRT
<213> Haemophilus influenzae

<400> 30

Thr Gln Ile Asn Gly Ser Ile Asn Leu Thr Asp Asn Ala Thr
1 5 10

<210> 31
<211> 11
<212> PRT
<213> Haemophilus influenzae

<400> 31

Gly Leu Ala Lys Leu Asn Gly Asn Val Thr Leu
1 5 10

<210> 32
<211> 12
<212> PRT
<213> Haemophilus influenzae

<400> 32

His Ser Gln Phe Thr Leu Ser Asn Asn Ala Thr Gln
1 5 10

<210> 33
<211> 12
<212> PRT
<213> Haemophilus influenzae

<400> 33

Ala Thr Val Asp Asn Ala Asn Leu Asn Gly Asn Val
1 5 10

<210> 34
<211> 18
<212> PRT
<213> Haemophilus influenzae

<400> 34

Asp Ser Ala Gln Phe Ser Leu Lys Asn Ser His Phe Ser His Gln Ile
1 5 10 15

Gln Gly

<210> 35
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<212> PRT
<213> Haemophilus influenzae

<400> 35

Leu Glu Asn Ala Thr Trp Thr Met Pro Ser Asp
1 5 10

<210> 36

<211> 11

<212> PRT

<213> Haemophilus influenzae

<400> 36

Thr Leu Gln Asn Leu Thr Leu Asn Asn Ser Thr
1 5 10

<210> 37

<211> 8

<212> PRT

<213> Haemophilus influenzae

<400> 37

Thr Leu Asn Ser Ala Tyr Ser Ala
1 5

<210> 38

<211> 54

<212> PRT

<213> Haemophilus influenzae

<400> 38

Arg Arg Ser Leu Glu Thr Glu Thr Thr Pro Thr Ser Ala Glu His Arg
1 5 10 15

Phe Asn Thr Leu Thr Val Asn Gly Lys Leu Ser Gly Gln Gly Thr Phe
20 25 30

Gln Phe Thr Ser Ser Leu Phe Gly Tyr Lys Ser Asp Lys Leu Ser Asn
35 40 45

Asp Ala Glu Gly Asp Tyr
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<210> 39

<211> 10

<212> PRT

<213> Haemophilus influenzae

<400> 39

Leu Ser Val Arg Asn Thr Gly Lys Glu Pro
1 5 10

<210> 40
<211> 10
<212> PRT
<213> Haemophilus influenzae

<400> 40

Gln Leu Thr Leu Val Glu Ser Lys Asp Asn
1 5 10

<210> 41
<211> 20
<212> PRT
<213> Haemophilus influenzae

<400> 41

Phe Thr Leu Glu Asn Asp His Val Asp Ala Gly Ala Leu Arg Tyr Lys
1 5 10 15

Leu Val Lys Asn
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<210> 42
<211> 14
<212> PRT
<213> Haemophilus influenzae

<400> 42

Gly Glu Phe Arg Leu His Asn Pro Ile Lys Glu Gln Glu Leu
1 5 10

<210> 43
<211> 18
<212> PRT
<213> Haemophilus influenzae

<400> 43

Asp Leu Val Arg Ala Glu Gln Ala Glu Arg Thr Leu Glu Ala Lys Gln
1 5 10 15

Val Glu

<210> 44
 <211> 73
 <212> PRT
 <213> Haemophilus influenzae

<400> 44

Leu Ile Ser Arg Tyr Ser Asn Ser Ala Leu Ser Glu Leu Ser Ala Thr
 1 5 10 15

Val Asn Ser Met Leu Ser Val Gln Asp Glu Leu Asp Arg Leu Phe Val
 20 25 30

Asp Gln Ala Gln Ser Ala Val Trp Thr Asn Ile Ala Gln Asp Lys Arg
 35 40 45

Arg Tyr Asp Ser Asp Ala Phe Arg Ala Tyr Gln Gln Lys Thr Asn Leu
 50 55 60

Arg Gln Ile Gly Val Gln Lys Ala Leu
 65 70

<210> 45
 <211> 27
 <212> PRT
 <213> Haemophilus influenzae

<400> 45

Asn Gly Arg Ile Gly Ala Val Phe Ser His Ser Arg Ser Asp Asn Thr
 1 5 10 15

Phe Asp Glu Gln Val Lys Asn His Ala Thr Leu
 20 25

<210> 46
 <211> 20
 <212> PRT
 <213> Haemophilus influenzae

<400> 46

Met Met Ser Gly Phe Ala Gln Tyr Gln Trp Gly Asp Leu Gln Phe Gly
 1 5 10 15

Val Asn Val Gly
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<210> 47
<211> 40
<212> PRT
<213> Haemophilus influenzae

<400> 47

Gly Ile Ser Ala Ser Lys Met Ala Glu Glu Gln Ser Arg Lys Ile His
1 5 10 15

Arg Lys Ala Ile Asn Tyr Gly Val Asn Ala Ser Tyr Gln Phe Arg Lys
20 25 30

Gly Gln Leu Gly Ile Gln Pro Tyr
35 40

<210> 48
<211> 17
<212> PRT
<213> Haemophilus influenzae

<400> 48

Gly Val Asn Arg Tyr Phe Ile Glu Arg Glu Asn Tyr Gln Ser Glu Glu
1 5 10 15

Val

<210> 49
<211> 20
<212> PRT
<213> Haemophilus influenzae

<400> 49

Phe Asn Arg Asn Ala Gly Ile Arg Val Asp Tyr Thr Phe Thr Pro Thr
1 5 10 15

Asp Asn Ile Ser
20

<210> 50
<211> 21
<212> PRT
<213> Haemophilus influenzae

<400> 50

Lys Pro Tyr Phe Phe Val Asn Tyr Val Asp Val Ser Asn Ala Asn Val

1 5 10 15

Gln Thr Thr Val Asn
20

<210> 51
<211> 19
<212> PRT
<213> Haemophilus influenzae

<400> 51

Phe Gly Arg Tyr Trp Gln Lys Glu Val Gly Leu Lys Ala Glu Ile Leu
1 5 10 15

His Phe Gln

<210> 52
<211> 26
<212> PRT
<213> Haemophilus influenzae

<400> 52

Ser Ala Phe Ile Ser Lys Ser Gln Gly Ser Gln Leu Gly Lys Gln Gln
1 5 10 15

Asn Val Gly Val Lys Leu Gly Tyr Arg Trp
20 25

<210> 53
<211> 8
<212> PRT
<213> Haemophilus influenzae

<400> 53

Gly Asp Ser Gly Ser Pro Met Phe
1 5

<210> 54
<211> 8
<212> PRT
<213> Neisseria gonorrhoeae

<400> 54

Gly Asp Ser Gly Ser Pro Leu Phe
1 5

<210> 55
<211> 7
<212> PRT
<213> Haemophilus influenzae

<400> 55

His Thr Tyr Phe Gly Ile Asp
1 5

<210> 56
<211> 28
<212> DNA
<213> Haemophilus influenzae

<400> 56
tgcaggatcc ccgcagactg gattgttg

28

<210> 57
<211> 28
<212> DNA
<213> Haemophilus influenzae

<400> 57
tgcaggatcc gatctgcccc accttggt

28

<210> 58
<211> 7
<212> PRT
<213> Haemophilus influenzae

<400> 58

Gly Asp Ser Gly Ser Pro Met
1 5